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The Therapeutic Gazette

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Original Articles

The Treatment of Carbuncles

BY WALTER ESTELL LEE, M.D., F.A.C.S.

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AND

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As one looks through the text-books and the surgical literature at the present time for the accepted treatment of carbuncles it is surprising to see the lack of uniformity of the various authorities. Poulticing, *x*-ray, the injection of carbolic acid, strapping with adhesive plaster, are all advocated as conservative measures, while the total excision of the infected tissues with the cautery knife or the scalpel is advocated in practically all of the more recent text-books.

Such a lack of uniformity in therapeutic measures usually indicates that none of the treatments recommended are entirely satisfactory (this is particularly true of surgical procedures).

Definition.—DaCosta defines a carbuncle as a circumscribed infectious inflammation of the deeper layers of the true skin and of the subcutaneous tissues, with a fibrinous exudation and multiple foci of necrosis and gangrene frequently developing in the tissues adjacent to each necrotic plug. Stewart tersely describes carbuncles as boils containing multiple cores.

Etiology.—A study of a group of over 150 cases, which began with our experimental work in the comparative values of antiseptics, has emphasized the necessity of understanding the etiological factors involved in this lesion in order to properly treat it.

Carbuncles are found most frequently on the nape of the neck, the back between the scapulæ, the buttocks, and sometimes on the face and lips. In all of these areas the skin is thick and tough, and is bound to the underlying fascia by strong fibrous bands, or septa, in such a way as to form a series of intercommunicating cavities, containing fat, hair follicles, and glands, and bounded above and below by tough skin and fascia. On account of these fibrous septa and the unyielding skin and fasciæ the inflammatory exudate which occurs in response to pyogenic infection is confined and produces great tension in the involved area. The blood supply of the infected area is diminished by this pressure, and in consequence considerable portions of tissue are likely to die and form a slough. The pointing of the abscess cavities in carbuncles toward the surface and their rupture do not occur until late, owing to the thick unyielding character of the skin. But there is an easy means of extension and relief of the pressure or tension in a lateral direction, through and among the septa of fibrous tissue, so that the adjacent fat columns very early become infected from the primary focus, with which they communicate. In the secondary foci the process is repeated, namely, increase of tension, suppuration, early necrosis, and further lateral spread combined with the difficult access to the surface of the skin. In consequence, when the central fat

columns have ruptured or discharged their contents of pus and necrotic tissue on the surface, the tension is not relieved in the spaces and pockets adjacent to them, and therefore the process continues to spread at the periphery.

The original infection probably takes place through an abrasion or a cut; it may rarely be due to conveyance by the blood or lymph streams. The causative organism is almost invariably the staphylococcus pyogenes aureus, as in other skin infections. It is important to remember that there is no fundamental difference between a boil and a carbuncle, but the difference is due solely to anatomical and mechanical differences in the areas of tissue involved. A carbuncle is a multiple boil, and a boil, if you will, with a college education.

Carbuncles are particularly apt to be found in those who are debilitated from other causes, for example, old age, diabetes, Bright's disease, and in those recuperating from exhausting diseases. The appearance of a carbuncle should always be an indication to examine the urine for sugar and albumin.

Symptoms.—The earliest *local symptoms* resemble those of a boil, but from the start the pain is usually more severe. The inflammatory area begins as a papule with an indurated base. It rapidly enlarges, is hot, dark-red, tender, painful and swollen, often brawny on palpation, and is not freely movable on the underlying parts. In a few days many pustules appear, and enlarged vesicles filled with bloody serum may form. In some cases, about the tenth day, the pustules may rupture and discharge freely, and the case slowly progress toward cure; but usually the carbuncle continues to spread at the periphery while the central pustules are discharging more or less freely. In such cases the deeper tissues are filled with pus, which is being incompletely discharged through the many small openings, each of which is partially blocked by a plug of dead tissue. Large masses of skin and subcutaneous tissues are destroyed; even the whole carbuncular area may become gangrenous. A sudden and practically complete cessation of pain points toward this complication.

The *general symptoms* begin usually with a chill and are almost always profound, especially in those frequent cases where the patient is already debilitated from other causes. Apathy and even coma are frequently seen, while on the other hand delirium is by no means rare. The temperature is of the septic type, and usually high, but may be subnormal. There is a high leucocytosis, as a rule, with an excess of polymorphonuclears, and absence of leucocytosis indicates either overwhelming infection or lack of resistance on the part of the patient.

In exceptional cases in which the disease is mild or the resisting powers unusually good, the constitutional effects may be very slight.

Prognosis.—In the ordinary case the prognosis is good. A carbuncle remains acute for about three weeks, and healing requires at least another month. The most dangerous site of the lesion is on the face; over 50 per cent of those on the upper lip are fatal, due to a spreading septic thrombosis from the facial to the ophthalmic vein, which communicates with cavernous sinuses. Death may be caused by profound septicemia, pyemia, hemorrhage, septic thrombosis of the cerebral sinuses, or, especially in diabetes, by acidosis or coma.

Diagnosis.—The diagnosis of carbuncle is made by noting the profound constitutional involvement, and the multiple foci of necrosis on an inflammatory base, with rather rapid lateral extension.

Although the diagnosis is usually and easily made by inspection, still there are certain conditions which must at times be differentiated:

1. Boils are conical and have but one opening. They are associated with little or no constitutional involvement.

2. Gummata are painless with but little inflammatory reaction. The edges are sharp and undermined. Their discharge is glairy and the slough looks like wet leather.

3. Anthrax is characterized by a black slough surrounded by a ring of vesicles.

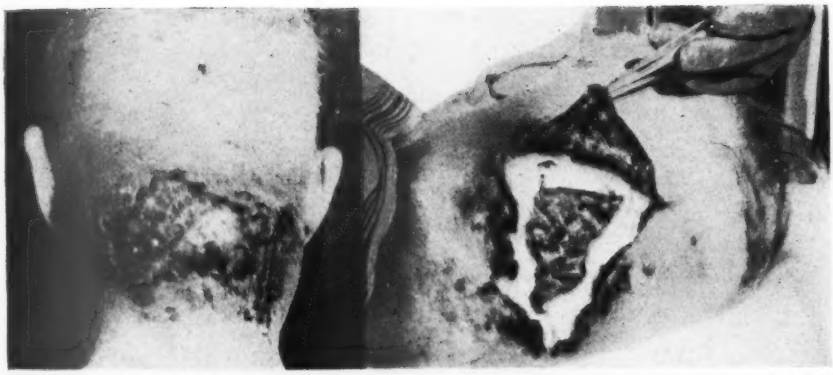

FIG. 1.—Carbuncle in a man of 72 years. Duration 12 days.

FIG. 2.—Crucial incisions, undercutting of flaps and packing of the wound with gauze saturated with a 5-per-cent solution of dichloramine-T. Operation on the 12th day.

FIG. 3.—Condition of wound when dressed 4 days after operation.

FIG. 4.—Condition of wound 9 days after operation.

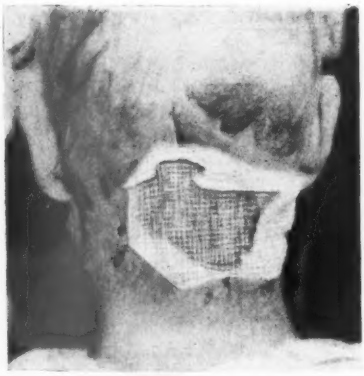

FIG. 5.—Wide-meshed, paraffined gauze applied to granulating surfaces.

FIG. 6.—Condition of wound 21 days after operation.

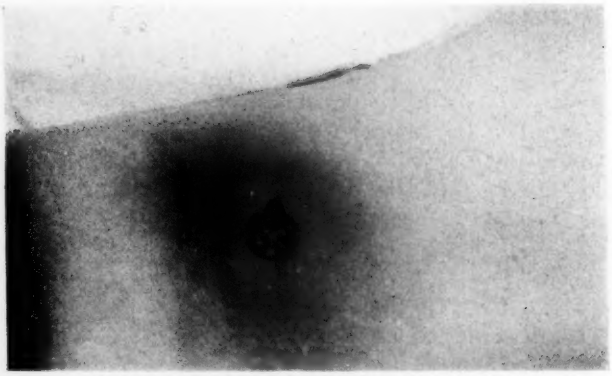

FIG. 7.—Carbuncle of 10 days' duration.

FIG. 8.—Crucial incision on the 10th day. Condition of wound on the 13th day and just before the secondary suture.

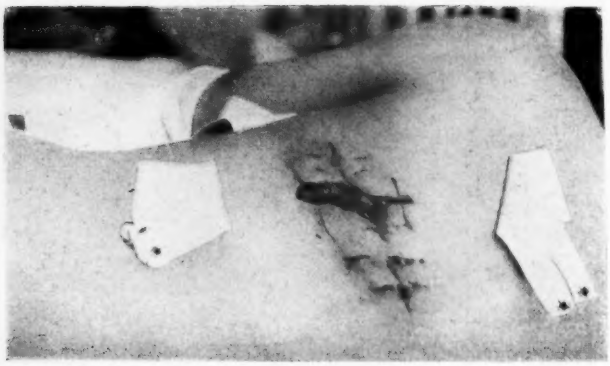

FIG. 9.—Condition of wound 10 days after crucial incision and 7 days after secondary suture.

There is usually very marked edema of the surrounding tissues, and swelling of the related lymph glands. There is little pain, though the constitutional reaction is often profound. There is no pus formation. The bacillus anthracis can be demonstrated in the vesicles surrounding the central slough.

4. Actinomycosis is a chronic infection; this alone is sufficient to distinguish it from carbuncle, which it somewhat resembles clinically. There is a multiplicity of sinuses in an enlarged and swollen base; but the discharge is a thin serous fluid, not pus, containing the pathognomonic sulphur granules, which microscopically consist of groups of the club-shaped budding bodies of the fungus.

Treatment.—There are two indications in the treatment of all pyogenic infections—the relief of tension and the removal of dead tissue. A consideration of the anatomy and of the mechanical factors involved in carbuncular infections shows that a number of simple incisions into a carbuncle is ineffective in meeting either of the indications, except along the plane of the incisions themselves. Elsewhere the tension is not relieved, nor is the dead tissue removed. This will be made clear if we compare the carbuncular area to a piece of honeycomb, which it much resembles. The incisions into a honeycomb, even if crucial or multiple, open only those cells which are directly in the path of the knife. If, however, we make an incision in a plane at right angles to the crucial incision, parallel to the surface, it is evident that all the cells will be freely opened.

After relief of tension has been obtained, the subsequent treatment of the infection consists in the surgical sterilization of the wound. This differs in no way from the principles of chemical sterilization which are applied in the treatment of any other form of suppuration. In other words, after we have relieved or removed the mechanical factors which make carbuncles instead of boils, we have the infection behaving exactly as a boil.

In the treatment of carbuncles as practiced at the Pennsylvania Hospital, a crucial incision is made, extending well beyond the indurated area in all directions, thus dividing the involved area into four sectors. Each flap so formed is undercut, with an incision parallel to the skin, and about midway between the skin and the deep fascia. This undercutting incision extends beyond the periphery of the indurated area, and should be made with a sharp knife. Its purpose is to open freely all the infected columnæ adiposæ in the involved area, relieving the tension in each of them and allowing a free discharge of the pus. It acts as a similar incision does in tapping a honeycomb before the extraction of the contained honey.

After each flap is undercut it is elevated as one would the flap of an envelope, and pads of gauze soaked in some germicide, preferably of the chlorine group, are packed under them to prevent the flaps from collapsing onto the wound. After twenty-four to forty-eight hours the gauze packs will be found loosened from the proteolytic effect of the exudate, and they are then removed. Systematic Dakinization of the wound is then practiced. Under this treatment all the dead tissue and slough is removed within a few days—six to seven at the most. When this has been accomplished the skin flaps are replaced on the wound in their normal relations, and are allowed to become adherent to the underlying granulating tissues. In many instances time can be saved by the practice of secondary suture, or adhesive straps can be successfully used to hold the flaps in place. Primary union of the flaps so returned into place is the rule, except for the tip of each flap, where the skin has usually sloughed before the patient presents himself for treatment.

The end result of this plan of treatment is a crucial linear scar, which is wider at the crossing of the two incisions. This result is obtained, in the average case, in from three to four weeks from the time the treatment is instituted.

Other Methods.—Other treatments have been more or less widely advocated. Strapping with adhesive plaster, poulticing and the multiple injection of carbolic acid are only mentioned to be condemned. They are

painful, non-surgical, carry a very definite risk of pyemia, and, worst of all, do not meet the surgical indications. The most these methods can do is to hasten the onset of gangrene of the whole area and its separation from the body as a slough.

X-ray treatments are sometimes successful in relieving the pain, but seem to have no other effect. We are not convinced that the advocates of this method have shown any diminution of the time of disability nor any reduction in the number of complications over untreated carbuncles.

Linear or crucial incisions do not fully meet the indications, as explained above, and such treatment is inefficient. Complete excision of the diseased area, of course, removes the whole carbuncle, but at the expense of total and permanent loss of a considerable amount of viable tissue. This operation is followed by prolonged disability, often requires a secondary skin grafting or plastic operation for closure, and results in an extensive and unsightly scar, which in itself has capacities for harm. Though undeniably efficient, it strikes one as unnecessarily heroic and destructive, and is no more to be recommended than the equally destructive process mentioned by Charles Lamb in his "Essay on the Roast Pig." In this essay, it will be remembered that Lamb described the inhabitants of some hypothetical foreign country as in the habit of burning down the pigstye with its contained pigs whenever they felt inclined to eat roast pork.

CONCLUSIONS.

In conclusion we feel that:

1. Carbuncles differ from other forms of suppuration in the subcutaneous tissues because of the anatomical and mechanical factors present in the region in which they occur, namely, a thick tough true skin connected with the underlying fascia by strong vertical fibrous septa. These factors not only prevent the breaking of the original focus through the skin, but also force it to spread laterally and become pocketed in the honeycomb-like area.

2. The tension is perfectly relieved in all these pockets of infection, when, in addition to the usual crucial incisions, incisions are made in each section parallel to the skin surface, which opens all the diseased fat columns. When this has been done, each area of infection acts like a separate boil, and is able to drain freely onto the surface.

3. The simple crucial incision is not efficient; excision *in toto* is unnecessarily destructive and prolongs the time of disability.

4. Certain other treatments for carbuncles which have been advocated are discussed and reasons given for their condemnation.

Abdominal Diagnosis in Children[1]

BY JOHN H. JOPSON, M.D.
Surgeon to the Children's Hospital, Philadelphia

While the subject of abdominal diagnosis in general is one which has received ample attention from the surgical standpoint, it is seldom that it is given special consideration as it concerns the common diseases of childhood. When these are discussed it is usually in connection with a study of an individual problem, whether it be appendicitis, intussusception, tuberculous peritonitis, or other special subject. While time does not permit an attempt to cover the entire field in a systematic manner, it will not be amiss to cover some of the general aspects of the subject, and to then discuss in detail some individual diseases, the diagnosis of which is required in early life.

The problem of diagnosis in general is somewhat different in the child than in the adult. In the first place we do not receive the same amount of aid in the way of a history of the disease from the patient. In some ways this is a drawback; in other ways an advantage. Kerley in his admirable book takes the ground that it is a distinct advantage. He looks on the sick child as

[1]Read before the Harrisburg Academy of Medicine.

a natural honest subject, with no preconceived ideas, not imaginative or hypochondriacal, and when he appears ill really is so, although not perhaps as sick as he appears to be. We cannot altogether agree with him, although in the main he is correct. We have all seen children, highly nervous, screaming from fright, shrinking from handling, perhaps by reason of apprehension, and denying that an examination gives discomfort or even actual pain. The pediatric surgeon learns that in such cases the examination requires time, patience, tact, and experience. Moreover, the fact that the history usually has to be elicited from the parent or nurse, who may be highly intelligent or observing, or completely lacking in common sense or powers of observation, is now a help and now a hindrance in eliciting the preliminary symptoms. The careful observations of an intelligent parent, however, can usually be relied upon, and are an added reason for spending ample time in securing a careful and complete history, personal and family, in all cases coming to us for diagnosis. Again, as Kerley emphasizes, prolonged experience in the observation of the normal child and of the sick child, including those suffering from medical disorders as well as surgical lesions, is invaluable to the pediatric surgeon. The art of observation and of the interpretation of symptoms is never more needed than in the study of patients at this age. Much can be learned by the facies, the color, the posture, behavior, response to external stimuli of all kinds, and all those objective features by which the child, its power of resistance broken by disease or suffering, shows the nature and severity of its disorder. To the pediatrist these observations, made by one experienced in the symptomatology not only of surgical but of medical diseases, are of the greatest significance. To them are added the results of a carefully taken history, a complete physical examination, made with the child stripped of clothing, an exhaustive laboratory study when indicated and when time permits, and *x*-ray studies, with careful interpretation of films, under the same circumstances.

To enumerate all the abdominal symptoms in turn, and tabulate the conditions in which they appear, would be unprofitable and confusing. We would prefer to take up some of the more or less common abdominal disorders, and to dwell on those points in differential diagnosis which we, along with others, have found most helpful. We may begin with certain of the less frequent conditions, comparatively rare in childhood, but so common in adults that they require exclusion in all doubtful cases. These include tumors of the gastrointestinal tract. Tumors can be briefly dismissed. Cancer is too rare to discuss. Sarcoma is rare. We have seen one case of sarcoma of the large bowel, and it occurs in other regions as well. In the large intestine one-third of the cases which Dr. C. Y. White and I collected from the literature were in children under ten years. It has the interesting feature that in general it does not cause obstruction, as it early involves the muscular coat and results in dilatation at the point of growth. In our case, reported years ago, the tumor was of large size, and of an aneurismal type, figuratively speaking. The usual symptoms of malignancy, plus tumor and late abdominal distention, were characteristic. At the present time *x*-ray diagnosis would quickly reveal the presence and nature of such a lesion. Occasionally, in infants especially, and in threatened or incomplete obstruction, the roentgenologist hesitates to administer barium either by mouth or colon in such a case. For example, we saw a child very recently, an infant, about a year old, in which Dr. John H. Gibbon requested our opinion. The pathological condition was, and is, most obscure; but there were weakness, anorexia, colicky pains, and great abdominal distention. Tuberculosis was apparently ruled out by the skin test. Dr. Diven and Dr. Gibbon had thought at first they felt a mass or collection in the right side of the abdomen, but later this was absent. Rectal examination, which is a valuable aid in children because of the shallow pelvis, and the opportunity for bimanual palpation of the lower abdomen, revealed a cystic feeling in the lower peritoneum, which might have been intestine distended

with gas. Yet Dr. Manges could not use the barium in this child, and only succeeded in eliminating large cystic kidney which had been thought of. I am inclined to think this child may have a malignant abdominal, perhaps intestinal, tumor from its resemblance to our previous case.

Ulcers of the stomach and duodenum occur in children, and in the case of gastric ulcer even *in utero*. Lee and Wells report a perforation which almost certainly occurred before birth, and was sealed over by the duodenum, causing obstruction at this point, as confirmed by operation on the tenth day of life, and also studied at the autopsy. They collected some 160 cases of gastric ulcer in children under ten years, with two other perforations in the new-born, where the ulcer must certainly have been present before birth. Such ulcers are single or multiple, occur often in connection with malnutrition and marasmus, show themselves by gastric disturbances, and are attended more or less commonly by hemorrhage, the blood being vomited or passed per rectum (melena). Duodenal ulcer also occurs in infancy, and has recently been studied by Dudley Palmer. Holt collected 95 cases. They too are single or multiple, are usually of the acute type, and often complicate the marasmic state. Vomiting, frequent and severe, mimics pyloric stenosis, while hemorrhage is common, and abdominal pain with its characteristic periodicity, facies, cry, drawing up of legs, etc., is also a symptom. Such ulcers may heal by cicatrization. Palmer's case was perhaps the first to be *x*-rayed, but the diagnosis was not made from the films; congenital stenosis was suspected, and the proper diagnosis made at operation. The child recovered after a pyloroplasty, and later a gastrojejunostomy. From congenital stenosis such a condition would be separated by the lateness of development (after 3 to 6 weeks), the greater pain, the presence of blood in vomitus or stools, the absence of tumor and true peristaltic waves, and the *x*-ray evidences of duodenal distortion, perhaps, or at least the absence of the characteristic retention of the barium meal.

Cholecystitis and cholelithiasis both occur in children, and while not extensively written upon, C. G. Farr, who reports five cases, believes them to be not very rare, and usually unrecognized. Indeed, there seems no very good reason why cholecystitis should not occur oftener, although if it were at all common autopsy reports in deaths from other ailments would or should reveal it. We have seen no case that we recall which was operated, although it may have been a factor in jaundice cases attributed to catarrhal obstruction of the duct. My associate, Dr. Pfeiffer, had a case at thirteen years. My youngest case was, I think, sixteen years. In Farr's series the cases were of an acute type, tending to suppuration, as usually happens in appendicitis in children. The symptoms are identical with those seen in the adult—pain, tenderness, rigidity, vomiting, fever, leucocytosis, jaundice. All exhibited acute symptoms at some time, and four of the five demanded operation. Acute appendicitis was present in mild degree in three cases, and may have been an etiological factor.

Congenital pyloric stenosis is a condition which we now fully recognize as one of the most important surgical ailments of the infant. It has only been so recognized within our generation, but has been so thoroughly studied and so often described in the literature that there is no reason why it should not be routinely recognized. I well remember when Still, the British pediatrist, was in this country a number of years ago, and he told me then it was a spasmodic condition, never seen at autopsy. But within a week or two, at the British Medical Association's meeting in Toronto, post-mortem specimens were shown, illustrating the pathology of what is now so frequently diagnosed and so successfully treated. The introduction of the Fredet-Ramstedt operation, and the transfer of cases to the surgeon when they are in the early stages of obstruction, has reduced the mortality to 15 per cent in large series, and 8 to 10 per cent in selected series. My own experience embraces 25 cases of the Ramstedt operation with four deaths. The diagnosis, once

familiarized, is usually easy. The time of onset is usually within the first three weeks of life; very seldom later than the sixth week. It is much commoner in males than in females. Vomiting is the initial symptom, occurs soon after feedings, is projectile in type. While the appetite is preserved, and the child ravenous, constipation is almost absolute. Loss of weight is rapid and progressive. There is no fever. Physical examination reveals the characteristic waves rolling across the epigastrium from left to right, when food and water are ingested, and the small, hard, oblong tumor can usually be felt at or below the right costal margin on deep finger pressure, especially if the stomach be first emptied by passing a catheter. Confirmation of diagnosis by the *x*-ray is one of the best methods which we possess. It is not always necessary, may be contraindicated in very ill babies, and requires a somewhat specialized technique in the way of timing the intervals between pictures, if films are taken. Fluoroscopy is simpler, but less easy of demonstration. The method we employ at the Children's Hospital enables Dr. Bromer to make a correct diagnosis very uniformly. Indeed, I have not yet seen him mistaken. The stomach should normally empty itself by the end of three hours if no pyloric obstruction is present. Failing to empty within this time can of course also be demonstrated by the suction bulb and catheter. Pictures are taken at the zero hour, 2-hour, 4-hour, 6-hour, and 24-hour periods (Fig. 1). In extreme cases the barium persists in the stomach for 24 hours. I believe this method is our best safeguard against operating in cases of pure pylorospasm, which certainly occurs in infants without true hypertrophic stenosis accompanying. There are cases in which both elements are present. I have myself operated on three cases in which no tumor was found, always in cases referred by an experienced pediatrician. I believe none of these cases had been *x*-rayed, at least by the method I have just described, and which of late has been our routine procedure. All recovered, and indeed seemed benefited by the exploration, although in only one did I do more than open and close the abdomen, and in that case I divided a slightly thickened, otherwise normal pyloric muscle. In one there was a family history of fatal illness in two or three preceding children. None indeed were living except this little and last arrival, and physician and consultant desired operation. The doctor wrote me a very exultant and very witty letter at the end of a year, when the baby was well and thriving. In pure spasm waves are said not to occur; we have thought we have seen them. But vomiting is less regular and persistent, constipation less

FIG. 1.—X-ray picture of infant with hypertrophic stenosis of the pylorus, showing gastric retention at the end of six hours. Diagnosis confirmed at operation. (From the Children's Hospital of Philadelphia.)

absolute, and a tumor not palpable. I am bound to say I sometimes cannot feel a tumor and do not regard it as essential to a diagnosis, although Dr. Wm. A. Downes of New York, whose experience is probably the largest in the country, if not in the world, tells me it can always be felt if the stomach is first emptied by the catheter.

Intussusception is the commonest cause of intestinal obstruction in children. It is commonest between three and nine months of age. It may occur as early as five days, as in Dowd's remarkable case of resection with recovery. It occurs in older children and in adults. It is nearly always of the acute progressive variety, going on to strangula-

tion and death from toxemia or exhaustion. Spontaneous recovery rarely takes place with extrusion of the intussusception. The chronic non-obstructing variety occurs as it does in the adult and we have seen one case in each group. We operated successfully in a girl of four years, with symptoms of two weeks' standing, without complete obstruction, and little vomiting. The symptoms of acute intussusception are so characteristic that there is rarely excuse for failing to make a diagnosis. A healthy breast-fed infant is suddenly seized with pain and vomiting. There may be a normal or loose movement, but soon thereafter mucus and blood appear in increasing quantity, and loose movements and flatus stop. The attacks of pain are intermittent and colicky in

FIG. 2.—Chronic intussusception of the ileocecal type in a girl of four years. Duration two weeks or longer. The small intestine is shown filled with the barium meal, while the large intestine is outlined by the barium enema as far as the intussusception, except where the descending colon is filled with air. Obstruction incomplete; reduction at operation without difficulty. Recovery. (From the Presbyterian Hospital in Philadelphia.)

nature, and between attacks the child is quiet. Pallor and signs of shock are noted early, with rapid pulse and prostration, but the temperature is not much disturbed. The abdomen is at first soft, and the typical tumor can often be felt in the epigastrium or left hypochondrium. Later it may be palpated through the rectum. But by this time distention due to obstruction obscures abdominal palpation, and the favorable time for operation has usually passed. In some cases it is advisable to give a barium enema and make an *x*-ray picture of the colon (Fig. 2). This will show the common type of intussusception, but does not exclude intussusception of the small intestine. The syndrome is a very typical one, and practically the o ly conditions which simulate it are acute indigestion and gastrointestinal intoxication, and acute enterocolitis. These exhibit prostration, vomiting, sometimes high fever, sometimes a normal temperature, but with a preceding and usually persisting diarrhea, in which mucus and blood may be present. The history of diarrhea, the passage of gas, the persistence of some fecal matter, and the absence of a tumor and of early distention are distinguishing features. Unfortunately physicians are prone to think of the common ailment first, and do not rule out what is in general practice a comparatively rare affection. It is analogous to the failure of the surgeon to make a diagnosis of such a condition as an acute pancreatitis for example, another disease with a characteristic syndrome, as Monynihan so graphically described recently, but which by reason of its rarity is usually overlooked even in the hands of experts, who are more prone to attribute the pain, rigidity, collapse, etc., to gastric perforation or internal strangulation, or other acute abdominal catastrophe. The difference lies in the fact that while the surgeon operates, even in the face of a mistaken diagnosis, the physician treats the case as gastroenteritis, administers calomel or castor oil, delays intervention, and in twenty-four to forty-eight hours the chances for successful operation have almost disappeared.

In Australia, where, for some unknown reason, intussusception in infants is extremely common, the results of operative treatment are extremely happy. In this country the mortality ranges from 50 to 70 per cent or higher, due mainly to late operation. In the Children's Hospital of Philadelphia in 9½ years there were 31 cases operated upon, with a mortality of 64.5 per

cent (Brown). The mortality in the first twenty-four hours was only 33.3 per cent. Contrast this with the results of Hipsley, in Australia, who had 51 cases without a death in cases operated under thirty-six hours, and only four deaths in his entire series, two of which being cases in which resection was necessary. Of three cases resected by him, one recovered. When the stage of irreducibility is reached, and this may be as early as thirty-six hours, resection is almost always fatal. We have had one recovery after resection, and when this case was reported we could find only 11 others in the literature, of infants which had survived resection.

Intussusception like appendicitis demands for its diagnosis familiarity with the symptoms of the common gastrointestinal affections of children. Acute indigestion, gastrointestinal intoxication, and enterocolitis are the most prominent, and if in cases of doubt the physician seeks a surgical consultation, or at least abstains from the use of purgatives, so deadly in obstruction and appendicitis, he will at least avoid doing harm.

Appendicitis is rare in children under two years of age. It is sufficiently common in older children, and has the striking feature that the first attack is usually the last. Perforation and peritonitis or abscess formation usually develop rapidly and surely unless halted by operation. Under five years the mortality is high. Over five years it is the same as in young adults, and that is too high, as we know (F. Beekman). It is twice as common in boys as in girls, and the mortality is twice as high in girls as in boys.

The symptoms are sudden onset with vomiting, fever, pain in the abdomen, tenderness, and an elevated leucocyte count. There is tenderness over the appendix, and while rigidity may be slight in cases not already perforated, the rectus muscle on the right side can usually be demonstrated to be on guard as contrasted with the opposite side. It is very necessary in children to be sure that the bladder is empty before making an abdominal examination for any reason. One may easily be misled in the presence of a distended bladder. In young children the onset is often insidious and the progress rapid, so that the diagnosis is often overlooked and a fatal delay results. Rectal examination should never be omitted, as it reveals local tenderness, induration, or pelvic abscess. In doubtful cases the operation may be an exploratory one. One should,

FIG. 3.—Congenital stenosis of rectosigmoid region of intestine in a child of two years. Marked dilatation of the colon. Chronic obstruction since birth. Treated by diet and enemata. Death later from pneumonia. (Patient of Dr. Chas. A. Fife.)

however, never operate in a doubtful case until pneumonia has been excluded. This mistake is one which has been frequently made, and a differential diagnosis is always present in my mind when I see a child with supposed appendicitis. In the series of 145 cases reported by Beekman, from the Bellevue Hospital, there were six instances in which a mistake in diagnosis was made and the appendix removed in children with pneumonia. Fortunately all recovered, but such is not the usual result. The mortality following such a mistake is more apt to be high. Many cases of right-sided pneumonia in children are associated with abdominal pain and rigidity. As a rule the diagnosis can be made from observation of the high fever, flushed face, moving alæ, respiratory grunt, rapid respiration, high leucocyte count, and the associated physical signs in

the lung. There are, however, cases of central pneumonia in which in the early stages differential diagnosis is very difficult. In such cases we advise an *x*-ray of the chest if possible, and if still in doubt prefer to temporize for from twelve to twenty-four hours and to keep the patient under observation. Very recently, in a case under the care of one of my assistants, Dr. Christie, I advised an *x*-ray, which was negative, and operation showed acute appendicitis to be present.

Routine use of the *x*-ray in abdominal diagnosis is a recent development and of increasing importance. Kerley and LeWald

FIG. 4.—Chronic hyperplastic tuberculosis of the cecum in a girl of 13 years, causing chronic intestinal obstruction, and great dilatation of the terminal ileum. Diagnosis by x-ray—obstruction of terminal ileum. Resection of terminal ileum, cecum and appendix, and ileocolostomy. Cured. (From Hospital of Graduate School, University of Penna.)

have done extremely valuable work in this line. I have spoken of its use in hypertrophic stenosis. It is valuable in chronic appendicitis. If the appendix remains visualized in the film for seventy-two hours after the barium meal, it is presumably diseased. We have been accustomed to think of chronic appendicitis as rare in children. We are reversing our opinion in this respect. It may be suspected in cases of recurring attacks of vomiting and gastrointestinal disturbances, associated with pain and diarrhea, with or without localizing symptoms. In one case on which we operated we found the large intestine filled with scybala from end to end, and this after two weeks of the most assiduous care and nursing. We believed that the torpidity was due to a reflex disturbance from the appendix. Cyclic vomiting may be due to the irritation of a chronic appendicitis, and be cured by the removal of the appendix. Congenital or acquired malformations or malpositions of the stomach, small and large bowel, diverticula, stenosis and obstructions due to external causes such as bands and adhesions, may give rise to symptoms of a chronic and obscure nature, and the use of the *x*-ray render a correct diagnosis possible (Fig. 3). It may be possible to correct such conditions in early life, whereas if they are overlooked they will result in a lessened vitality from which the patient never entirely recovers.

Tuberculous peritonitis is not uncommon in children, especially in the colored race. It is divided clinically into two forms, the ascitic (wet) and the fibrous (dry). Some of the latter are of the so-called ulcerative type in which there are areas of caseation or suppuration. Both are usually of slow and insidious onset, with moderate fever, loss of appetite, vague abdominal pain, loss of flesh, and digestive disturbances. In the ascitic form there is a general or localized accumulation of fluid, which can usually be recognized by the ordinary tests for fluid in the peritoneum. We have seen a localized collection on the right side mistaken for hepatic enlargement by an experienced surgeon. The tuberculin test is of great value in young children. The fibrous form is similar in its general symptomatology, but instead of the local signs of fluid one feels the masses here and there in the abdomen, due to thickening and adhesion of bowel and omentum. A cold abscess sometimes points at and discharges from the umbilicus. We have seen one such case. The tuberculin test is usually positive. In doubtful cases both humanized and bovine tuberculin may be used. While the tuberculin test is of value in the diagnosis of tuberculous lesions generally in childhood, it may be entirely negative in cases of very advanced local lesions, when associated with general miliary infection. Early diagnosis is important, as surgery is valuable in the ascitic

or wet cases, and heliotherapy and climatic and hygienic measures are indicated in all types. Only rarely in children is it possible to remove a primary local lesion. In this respect, as Dowd points out, children differ from adults, especially women, where a tuberculosis of the tubes or a diseased appendix can be surgically extirpated. We have seen one case in a child in which the tuberculous process was confined to the bowel, where it was chronic and of long standing. The diagnosis was greatly aided by the *x*-ray, which showed a chronic obstruction and great dilatation of the terminal ileum (Fig. 4). The nature of the obstruction was revealed at operation, when a chronic hyperplastic tuberculosis of the cecum was found. In this case a resection of the terminal dilated ileum and of the cecum was successfully performed.

Treatment of Constipation in Infancy

BY J. CLAXTON GITTINGS, M.D.
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The authors of the older text-books on pediatrics had little or nothing to say about constipation in infancy. In modern practice it usually is the bottle-fed baby who suffers from it. Since breast feeding was almost universal in the last century, the conclusion is inevitable that breast milk *per se* is less apt to cause constipation than artificial feeding.

Probably the most important difference between human and cow's milk so far as constipation is concerned is the ratio between fat and protein.

In the early days of bottle feeding, the attempt was made to imitate this fat-protein proportion of mother's milk by using cream in the mixture. The Meig mixture, for example, had a formula of approximately 1.1 per cent protein, 4.5 per cent fat, and 6 per cent sugar. It was found that such a mixture would often cause vomiting, but it certainly was less apt to cause constipation than a mixture containing less fat and more protein.

For various reasons, which cannot be included in the present article, we can hardly expect to feed successfully a protein-fat ratio with cow's milk which is the same as that of human milk. Other methods, therefore, must be found for overcoming constipation.

Constipation is a relative term and implies not merely infrequency but also deficiency in amount. A breast-fed baby may have two or three somewhat loose stools a day. After weaning a single daily stool may be passed, but if this be well digested and of sufficient bulk it may be quite sufficient. Less than one stool a day in infancy certainly constitutes a "constipation" and cannot safely be disregarded. It is also worth remembering that constipation may cause abdominal discomfort or colic, and restless sleep.

Constipation is chiefly a symptom in babies fed solely on cow's milk. As the diet is changed at six to eight months to include cereals, broths, strained vegetables, stewed fruit juices, etc., most of the cases will automatically clear up unless there is actual obstruction or atony.

General Principles.—Before taking up details of diet, certain general principles may be discussed.

When the stool is abnormal, too dry or compact, or too small in bulk or soapy, we should attempt to change its characteristics before using laxatives.

When the stool is soft and moist, the difficulty must be in the motor or reflex mechanism. This is particularly apt to occur in babies who have been allowed to contract the suppository or enema habit. Glycerin and soap suppositories or enemas act as local irritants; the bowel soon becomes accustomed to them, and the natural stimulus of feces in the rectum fails. The best local stimulus to defecation is a gluten suppository or a small enema (1 to 2 ounces)

of normal salt solution (one level teaspoonful of salt to a quart of water), because they are not irritating. As soon as the baby can hold its head up, usually by the fourth month, it should be placed on the nursery chair for its stool at a definite time each day. The back must be well supported by a small pillow, and not more than four to five minutes should be allowed. Just before it is placed in the chair the anus may be pressed gently by the finger greased with petrolatum or the tip of the syringe inserted. Until the habit is formed a bulb of normal saline also may be needed, but after two or three weeks all artificial stimuli usually can be discarded unless the stool becomes abnormal.

Boiling milk increases the tendency to constipation. If boiling is essential for any reason, it will often be difficult or impossible to avoid the use of artificial laxatives. This is one of the advantages of lactic acid, to be mentioned later, because it has definite inhibitory action on the growth of many pathogenic organisms and boiling often can be dispensed with.

All constipated babies should be encouraged to drink water between feedings. The addition of water to the daily allowance of orange juice makes the latter more digestible.

Sugars have a tendency to act as laxatives by favoring fermentation. Unless fats form an excess of soaps in the intestines, they also act as laxatives. Neither sugar nor fat can be fed in excessive amounts without the risk of causing indigestion, especially in hot weather, but a sugar percentage of at least seven almost always is permissible when the fat is not too high, and a change from one form of sugar to another often works well —for example, from lactose to a dextrin-maltose preparation.

Diet.—Given a case of constipation in a bottle-fed baby, the first consideration therefore should be given to the characteristics of the stool. When that is composed of small, hard, dry balls, it probably is due to too complete absorption both of food residue and of water. The latter is evidenced by the almost constant and copious passage of urine. This is apt to occur when the mixture is highly diluted, particularly when the fat and sugar are low. The remedy is to increase the strength of the mixture and possibly to change the sugar. For babies three months of age or older, the use of a cereal gruel as a diluent for milk instead of water adds bulk to the stool and overcomes many cases of constipation. Different flours are supposed to have different effects. These are by no means uniform. For example, oatmeal is supposed to be laxative and barley flour constipating. Oatmeal seems to undergo fermentation more easily, and for that reason is hardly safe for young babies, especially in hot weather. Barley, or rice or whole-wheat flour, however, may act either way, which can only be determined by trial.

In other cases the stools may be quite bulky and molded, but somewhat dry. These stools usually contain an excess of soaps. If the fat percentage is high, it may be reduced and replaced by sugar—or the sugar alone may be increased. In both this and the former type the water intake should be increased between feedings.

When digestion is perfect and various changes in the carbohydrate and fat have been made and faulty habits corrected, constipation may still persist. In such cases the addition of lactic acid U. S. P. (one teaspoonful to the pint of milk) as suggested by Marriott, or of lemon juice (21 cc to the quart of milk) as suggested by Hess, is particularly useful.

Milk so prepared, with sugar added such as dextrin-maltose, Karo, or cane-sugar, may be fed without dilution with water, but it is not yet certain that such concentrated food is altogether desirable, especially in hot weather. Dilution of milk one-third or one-fourth with water will not destroy the value of the preparation in overcoming constipation, and it is also possible, at least when lactic acid is being fed, to increase the sugar to 9 or 10 per cent if desired.

The widely advertised use of cultures of B. Acidophilus or B. Bulgaricus also may be considered. Undoubtedly the normal fermentative processes in the intestine favor regularity of the bowels, while abnormal fermentation probably is a potent cause of

diarrhea. Babies fed on milk soured by these bacilli rarely suffer from constipation, but the mere administration of the liquid culture is not always sufficient to act as a mild laxative. It may be tried, however, when the soured milk is not available.

A comparatively easy method for the home preparation of B. Acidophilus milk is the following: In the morning boil a quart of milk for three to five minutes with active stirring. Put in a jar, tightly cap, cool, and keep on ice until evening. Boil again for three to five minutes, cool to 100° F. (using a dairy thermometer), pour into a thermos bottle, and add one ounce of an active culture of B. Acidophilus. Cork and let stand all night. In the morning pour into a bowl and beat vigorously with an egg-beater.

The secret of complete success in preparing this milk is to secure a sterile product for inoculation with the culture and a culture which is active. A sterile milk can be obtained only by heating under pressure (autoclave) or by fractional sterilization. The double boiling, however, is a distinct improvement over boiling once. Failure to secure satisfactory results with it suggests that the culture is not active. Two ounces of the soured milk may be saved for a ripener, to save expense of the culture, but a new implantation should be made every four or five days.

Apart from diet, constipation is often due to lack of tonicity in the muscular coat of the bowel and, to a less extent, of the abdominal wall. This is seen most characteristically in rickety babies between the sixth and eighteenth months of life.

Even earlier than this, or in cases without marked rickets, we find true atony resulting from chronic indigestion and flatulence. The causes of the indigestion may be various, but the too early feeding of starch is one of them. Anemia from whatever cause often accompanies and probably accentuates the distention.

The treatment of these cases of atony is correction of the dietary defects, fresh air and sunlight, opportunity for exercise according to age, strychnia (grain 1/500 to 1/400 three times a day), and abdominal massage. Anemia, if severe, calls for heliotherapy, hypodermics of iron citrate and sodium cacodylate (of each grain ¼ to ½ once daily), or blood transfusions. Iron by mouth may increase constipation or cause indigestion and seems to be of little or no use in improving the anemia. The feeding of green vegetables should be started as soon as the state of the digestion permits.

Stenosis of the pylorus also is a frequent cause of constipation.

Other and more rare causes for constipation must always be borne in mind in making a diagnosis.

In the first days of life we may encounter instances of congenital atresia of the bowel. In such the meconium is slow to pass, normal feces never appear, and vomiting occurs early with increasing distention. If the anus be imperforate or the rectum stenosed not even meconium is passed.

Dilatation or excessive redundancy of the colon or sigmoid flexure may be operative factors. A ready means for determining delay in the evacuation time is to give ½ to 1 grain of the vegetable dye carmine (not the coal-tar derivative) and then to move the bowels by water enema every 12 hours, beginning 24 hours after the dye has been taken. The normal time for passage is from 12 to 35 hours. Delays beyond 36 hours are suggestive of mechanical defects which would indicate *x*-ray studies.

In certain nervous babies constipation seems to depend on a hypertonicity of the rectal sphincter. This can be determined by a rectal examination or even by the resistance offered to the rectal syringe. For its relief, atropine or belladonna suppositories, 1/500 to 1/800 grain, or 1/24 to 1/32 grain, at two or three months, or gentle dilatation of the sphincter, are indicated.

A fissure of the anus may cause constipation. The treatment includes extra care in cleansing after stool and the use of an ointment such as calomel grain xxx, zinc oxide grain xx, petrolatum ½ ounce, to be applied after cleansing. In stubborn cases the fissure may be touched with lunar caustic. Hemorrhoids may also be a rare cause of reflex inhibition.

Among unusual mechanical causes for

constipation may be mentioned tumors, particularly where they involve the pelvis, and bands of adhesions resulting from previous inflammation such as appendicitis. Never to be forgotten is intussusception, which at times may be subacute and mistaken for ordinary colic.

Morse and Talbot also call attention to mild hypothyroidism as a cause for constipation. In well-marked cretins of course the relationship would not be overlooked. In fat, lethargic, constipated babies with dry skin and hair, and especially if there is a tendency to keep the tongue slightly protruded, thyroid gland ¼ grain once or twice a day may be cautiously tried. This should never be given unless the babies are to be under constant observation and frequently weighed.

Treatment.—While we are waiting for dietary changes to be effective, we must use certain laxatives. The simplest of these are normal saline enemas, gluten suppositories, mineral oil, and magnesia. Alternation is safer than the constant use of any one thing. A small bulb full (2 oz.) of saline may be sufficient as an enema, repeated if necessary, or a larger amount (6 to 8 oz.) may be given through a soft-rubber No. 20 (French) catheter with the baby lying on its left side and the buttocks elevated. The fact that large enemas may cause a tendency to syncope must not be forgotten. Gluten suppositories may be used in place of the bulb of saline solution. Mineral oil, with or without agar-agar, in one- to two-drachm doses, is most useful, especially where the stool is of the dry "marble" type. Milk of magnesia in one- or two-drachm doses usually is effective without causing pain.

For very constipated babies an occasional dose of castor oil (1 drachm once or twice a month) with the mineral oil is permissible so as to insure a thorough evacuation.

For older infants, six to eight months or over, 10 to 30 drops of aromatic cascara may be used with mineral oil, in place of castor oil.

The use of even simple drugs and local stimuli always is to be deprecated. Nevertheless, when dietary corrections and exercise, fresh air and sunlight have failed to cure, therapeusis becomes essential.

When obstinate constipation persists beyond the eighth month in spite of mixed feeding, and without such causes as rickets, a gastrointestinal *x*-ray is indicated to rule out a possible malformation.

Objective Diagnosis of Chronic Constipation

BY MEYER GOLOB, M.D.

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Although the subject of chronic constipation has received much attention in medical publications in recent years, comparatively very little of what has been written is devoted to the use of objective methods for its diagnosis. The result of the omission, if such it may be termed, has undoubtedly been to favor the retention of the older and more speculative means of diagnosis, somewhat at the expense of the science of medicine and the well-being of the patient.

It is maintained by Canick[1] that in "95 per cent of all cases of constipation, excepting those due to neoplasm or stricture, normal function may be restored by proper treatment, if each case is given the benefit of all the clinical and laboratory procedure by which the cause of constipation may be discovered."

In thus stressing the cause of constipation, Dr. Canick, it seems to me, comes quite close to the truth. In this malady the problem of proper treatment is, of course, quite secondary to a correct diagnosis, precise and complete. The most painstaking clinical examination does not always tell the whole story. And, if we except those cases wherein one is fortified by findings devel-

[1]Canick: Factors in the Rational Treatment of Constipation, *American Medicine*, Jan., 1924.

oped by digital or proctosigmoidoscopic exploration, a diagnosis based on a history alone—as is often the case—is at best a random shot, and the treatment it indicates a speculation.

With our modern roentgenographic facilities for study of the digestive tract, we must assign to such subjective methods a secondary rôle, and place our main reliance upon the photograph of the *x*-ray camera and the motion picture of the fluoroscope. These show us where the constipation is, and what caused it. When a likely diagnosis is reached by other methods, they certify the findings, and if perchance the costiveness is a reflex of a more serious underlying pathology, the revealing light of the *x*-ray will, in all probability, bring it to our attention. In this connection, it was said by Carman that "Since constipated persons show a retardation of the alimentary current, and since apparent angulations of the bowel are often seen in the roentgenograph, the *x*-ray offers easy confirmation of the stasis and shows its apparent cause."

Constipation is a comprehensive term, for it pertains to every condition which is concerned with inefficient intestinal emptying. This want of efficiency may be disclosed by delayed or incomplete evacuation, or as an abnormality in color, form, or consistency. A classification widely accepted is that of spastic and atonic constipation.

In the former the colon is irritable and hypertonic—a condition aptly described by Schwartz as "diskinetic." In the atonic cases, which Schwartz terms "hypokinetic," the peristaltic activity is below par and hence incapable of forcing the fecal contents onward. To these two groups a third may be added with advantage. In this group, called "dyschezia" by Hurst, the transportation along the colonic tract is efficient until the fecal matter reaches the ampulla recti, where it is halted without a further call for defecation.

The writer agrees with Alvarez that the spastic type is the form most frequently encountered, and that an atonic case is but rarely seen. Even in the asthenic habitus with markedly ptosed organs, enterospasm is the rule.

It is noteworthy that the most common types of constipation do not bring the patient to the doctor, but are treated at home with a multitude of drug-store remedies, until the incidence of a more serious malady brings them to the attention of the physician, and thus, perhaps, to the scrutiny of the *x*-ray. But the physician, himself, is too often disposed to look upon a simple case of chronic constipation as a very unimportant disease and the employment of roentgenography for its diagnosis as an unwarranted extravagance. This attitude does not inure to the

FIG. 1.—Illustrating redundancy of the iliac colon and proximal colon.

benefit of the patient. Judged by its evil effects upon the body economy, a neglected case of chronic constipation is a serious malady, calling for as much skill and knowledge in its diagnosis and treatment as the science of medicine affords. It may be noted that the sufferer is not always the victim of his own indifference, for we all know of instances where such physical and clinical studies as are commonly resorted to have fallen short of effective diagnosis.

In my own practice I found cases whose salient symptoms were merely generalized aches, with chronic fatigue and dizziness. A physical examination failed to reveal any

pathology. Yet the *x*-ray disclosed stasis in the colonic tract, either proximal, distal, or rectal, which, notwithstanding that the history told of the daily bowel evacuation, was filled from the hepatic to the splenic flexure even at seventy-two hours after ingestion of the opaque meal, showing the evacuations to have been incomplete.

A routine Roentgen study for constipation has often been the medium for disclosing some inhibitory phenomenon of the prima via, which proved to be a reflex of a much more serious disease. As an illustration of this may be cited the cecal stasis caused by a reflex inhibition, the remote source of which is situated in the upper or lower quadrants, viz., a diseased gall-bladder, chronic appendicitis, or right-sided diseased uterine adnexa. Or we may detect retention in the cecum and ascendens because of exaggerated antiperistalsis. The prevailing movement in the proximal colon being normally antiperistaltic, and thus tending to retain the feces in the cecum and ascending colon, it is quite clear that if the motion be accelerated, the tendency to retain the feces would develop into stasis.

FIG. 2.—Indicating the anatomic cause of the trouble—a marked redundancy of the distal colon and postoperative (?) adhesions in the right iliac fossa.

It is also worthy of note that symptoms referable to cecal stasis are more aggravated than those pertaining to stasis of the distal colon. In stasis of the ascending colon or terminal ileum, the intestinal disturbances are generally severe. This is plausibly accounted for by Hurst in that the fluidity of feces, as is often evidenced by the boggy cecum disclosed to palpation, promotes bacterial activity and thereby induces a more rapid absorption of the toxins.

The vital objection to a complete dependence upon subjective diagnostic methods lies in that neither a clinical nor physical study can determine for us, save in the rectal area, the location or type of the constipation. Yet both are essential to a proper diagnosis. Without these the treatment is empyrical—based, at its best, on intelligent guessing. If we prescribe an enema, it will be efficacious for stasis in the rectum, but neither enema nor laxative is of avail if the stasis happens to be in the pelvic colon! On the other hand, a roentegenograph orients the stasis, fixes its type and quantity, and thus indicates with precision the proper remedy. Verily one can say here "seeing is believing."

In my own practice, as the following cases and photographs drawn from my files will show, the *x*-ray has done all that is claimed for it.

Case 1 illustrates stasis of the pelvic colon. The contents are held back from entering the rectum and so setting the center of defecation into play. A squatting position with voluntary contraction of the abdominal muscles, thereby overcoming spasm at the pelvi-rectal junction, is all that was required to bring about normal bowel movement.

Cases 2 and 3.—These two cases with their accompanying photographs (Figs. 1 and 2) may well be considered together. Both are examples of marked redundancy of the distal colon. In Case 2, that of a married laborer of about forty years of age, of mixed habitus, the history was entirely negative, save for the complaint that "I would be feeling well, if not for constipation." The treatment given was one very generally prescribed; oil enemata or oil by mouth and a properly regulated diet. There

is, to be sure, some likelihood that this patient would have received the same treatment if the diagnosis had not been established by the objective method. Why, then, the *x*-ray? The answer is strikingly given in Case 3.

The patient in this case was likewise a male of about the same age and habitus as in Case 2, but presented symptoms varying from those seemingly ascribable to appendix dyspepsia to suggestions of an ulcer syndrome. When he came to me the surgeons had already operated. There was an appendectomy and an exploratory laparotomy. But no relief.

Figure 2 indicates the anatomic cause of his trouble—a marked redundancy of the distal colon, to which a complication had been added in the form of postoperative adhesions in the right iliac fossa.

Constipation is quite characteristic of a redundant colon. Dr. Hirsch, of New York, in a personal communication to me, takes

FIG. 3.—Showing a marked dyschezia.

this view and incidentally suggests the use of a barium suspension enema as the best way of graphically illustrating this condition. Dr. Pfahler of Philadelphia has written me to the same effect, adding that such redundancy is frequently met with. The history of this patient showed that he had suffered with constipation for a long time. An ounce of prevention in the form of a roentgenographic diagnosis of his dyspepsia would have saved him from this peck of trouble. Apropos of this, I might state as my firm belief that cases presenting vague symptoms almost invariably derive greater

FIG. 4.—Showing a mobile cecum and redundancy of the iliac colon and displacement of the cecum.

benefit from the omissions than the commissions of surgery.

It is interesting to note that in all cases of constipation for which the basic cause is redundancy of the distal colon, the costiveness appears somewhere in the ages between thirty and fifty; thus indicating that the time element is somehow a factor in developing a potential anatomic anomaly into a kinetic cause of constipation.

Case 4.—This case is cited to demonstrate a statement made somewhat earlier in this paper, that the history elicited from the patient is at times quite misleading. The complaint for which relief was sought was diarrhea of four to five movements daily. The stools were small but well formed. The neurotic element as a possible factor was eliminated. The roentgenographic examination disclosed a well-dilated cecum, wherein the fecal matter would accumulate until partial ejection into the distal colon was effected by the propulsive action of the in-

coming feces. There was no delay in passage from the distal colon. A diagnosis of cecal stasis was made and the treatment changed from that for diarrhea to cecal stasis.

Case 5.—This patient, a male of about thirty-eight years of age, of asthenic habitus, presenting a negative history, complained of dizziness, headaches and "an out-of-sorts feeling." Save for his incessant smoking he had no bad habits. A droop to the right corner of his mouth was due to the habitual use of a pipe, to which was added two or three cigars and 20 to 30 cigarettes as a daily allotment! The *x*-ray showed marked enterospasm and a right-sided stasis at 48 hours p. c.

It would hardly be right to expect a total abstinence from intoxicants, whether in the form of spirituous liquor or nicotine poisons.

FIG. 5.—Showing resumption of normal position by the cecum after evacuation.

The radiograph was carefully interpreted to the patient. He has reduced his smoking to an occasional pipe and two or three cigars a day, and his symptoms have disappeared. No medication was resorted to.

Case 6.—This was a woman of forty, a multipara, with complaints of headaches and constipation. The illustration (Fig. 3) shows a marked dyschezia. She was referred to a gynecologist, who reported the presence of an old tear of the perineum, involving the levator ani muscle. A perineorrhaphy brought tonus to the rectal wall, resulting in the disappearance of the constipation.

Case 7.—In this case, drawn from the files of the Vanderbilt Clinic, constipation and tenderness in the right iliac fossa led to a diagnosis of pathology in appendix, and an appendectomy was considered. Through a barium suspension enema the trouble was traced to a mobile cecum (which was probably due to a stretched fixation apparatus) and a redundant iliac colon. This is clearly shown in Fig. 4. The cecum and ascendens had been forced upward by the filling of the redundant sigmoid, causing them to double up against the proximal colon, thereby producing the tenderness in the right iliac fossa. In Fig. 5 the cecum has resumed a normal position in the pelvis, following evacuation of the barium.

A treatment for constipation instead of surgical intervention well fits this case.

CONCLUSIONS.

1. A diagnosis cannot be based on a history alone, because it is often misleading; nor on clinical and physical studies, because they are not sufficiently informative.

2. Roentgenography offers a method of precision for determining the presence, amount, type, and orientation of the stasis.

3. A diagnosis of chronic constipation cannot be made as such; both the type and location must be known before treatment can be given.

4. The treatment must vary to accord with the location—an enema may relieve stasis in the rectum, but not in the pelvic colon—and with the type; a cellulose-free diet is indicated by the spastic type, a cellulose plus diet by the atonic type.

5. The *x*-ray is often the only means for ascertaining whether the dyspepsia is a reflex of a much more serious underlying malady, the presence of which is otherwise concealed.

6. Roentgenography applied to the diagnosis of constipation may obviate surgery.

38 WEST 76TH ST.

The Clinical Application of Gastric Analysis[1]

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Philadelphia, Pa.

In introducing the subject "The Clinical Application of Gastric Analysis," I shall first review briefly the historical events leading up to the modern analysis of the stomach contents.

The stomach tube was first introduced by Physick in 1812, though but slight attention was given to it until Kussmaul in 1867 and Von Leube in 1871 revived interest in this method of examining the stomach, and presented modifications of tubes, designed for this purpose, all of which proved to be unsatisfactory. Ewald, in 1875, finally brought out the type of stomach tube having a suction bulb, with which we are all familiar, as it is still in common use and is even preferred to-day by some workers. It is only during the past fifty years that any really valuable contributions have been made to the subject of gastroenterology. The first of these was that of William Beaumont, who made extraordinarily accurate and enlightening observations of the physiology of the stomach on his patient Alexis St. Martin, who had a gastric fistula resulting from a gunshot wound. The Russian, Pavlov, as a result of his exhaustive investigations on the function of the gastrointestinal tract in laboratory animals, reached conclusions that were not materially different from those of Beaumont made some time earlier. Pavlov's era marked the beginning of a great interest, which was gradually aroused, in the chemistry, physiology, and pathology of the digestive tract.

Hayen, Schule, and others now began to appreciate the fact that an accurate analysis of the secretory response of the stomach could better be made by examining portions of the stomach contents secured at different periods of digestion; and they accomplished this by removing the entire stomach contents at different intervals on successive days. This idea was further developed by Ehrenreich, and to him must be given credit for making the first study of the entire gastric cycle. In order to carry out these investigations he introduced a Nélaton catheter into the stomach. It was he who first presented what is known to-day as the fractional method of gastric analysis.

As time passed, it was realized that intubation of the duodenum was required, in order that this portion of the digestive tract could be studied, and the results checked up with the laboratory studies constantly being presented by physiologists. Such intubation of the duodenum was first performed by Hemmeter, in Baltimore, in 1895. The various tubes and methods devised were unsatisfactory, however, and it remained for Einhorn of New York to give us, in 1909, the first of the modern practical duodenal tubes. His tube was fitted with a metallic tip or capsule, which enables one to study not only the fasting stomach, but also the digesting stomach throughout the complete cycle of digestion. Special metal capsules have since been designed by Palefski, Rehfuss, Buckstein, Lyon, and others. Einhorn and Chace have only recently introduced a tube for simultaneous examination of the stomach and duodenum; most recent of all is a jointed intestinal tube described by Einhorn and Buckstein, for studying the intestinal tract at lower levels.

Though there are various types of meals designed for special study of the stomach and duodenal contents, the most commonly accepted ones, for all practical purposes, are the Ewald meal consisting of two slices of bread and one large glassful of water, employed for studying secretory function, and the Riegel meal consisting of an average meat and vegetable dinner and one-half dozen stewed prunes or some raisins, which is used for studying motor function. For the ordinary routine analysis, both of these meals should be given, the Riegel meal on the evening before the examination, and the Ewald meal on the morning of examination. The patient is instructed to present himself without having eaten any breakfast, and the duodenal tube is passed into the fasting

[1]Read before Main Line Branch of Montgomery County Medical Society, Haverford.

stomach. The residuum is then aspirated and is carefully analyzed.

At this point I wish to emphasize the fact that it is this examination of the residuum from the stomach which is coming to be recognized as the most important step in gastric analysis. Normally the fasting stomach may contain from 5 to 75 cc. In my personal experience, lower figures are the rule. An amount above 75 cc indicates either hypersecretion or retention, differentiation of which is determined by microscopic examination. If excessive amounts of residuum have a total acidity value of over 70, ulcer may be suspected. While 5 per cent sediment may be regarded as normal, quantities in excess of this point to imperfect or delayed digestion, or to retention. Mucus that floats and is found in bulk generally has been swallowed, while that intimately mixed with the stomach contents is usually of gastric origin. The acidity of the residuum varies, even in the same individual, but the average free acidity is 20 per cent and the total acidity is 30 per cent. Regurgitation of bile, accompanied with trypsin, into the fasting stomach is a common occurrence, and is frequently a normal finding. It is quite often encountered in postoperative cases in which the motor mechanism has been interfered with, due to the fact that the patient has gagged a great deal, and in cases of hyperacidity where nature is attempting to effect neutralization.

The microscopic examination of the residuum yields most valuable data. Normally there should be no microscopic evidence of food in the fasting stomach. Such evidence means retention—and such retention usually means a serious condition about the pylorus, the nature of which must be determined by other studies. The presence of a large amount of mucus suggests chronic gastritis, and, if associated with colonies of bacteria, it indicates gastric infection. Mucus, if bile-stained, is generally of duodenal origin. Leucocytes in excess mean pus, and the type of epithelial cell found with the pus indicates its origin—buccal, respiratory, or gastric. Gastric pus is of diagnostic significance in early carcinoma and ulcer, while bile-stained pus associated with cuboidal or columnar cells from the duodenum suggests disease of the biliary tract. In a highly acid stomach chief and parietal gastric cells may be found, all showing cloudy swelling, but the presence of numerous free cellular elements usually suggests atrophic gastritis. Occult blood alone is of no great significance, as it is often the result of trauma, but regurgitation of occult blood and bile makes one exceedingly suspicious of duodenal ulcer. Sarcinæ and yeast cells and the Opler-Boas organism indicate retention and stagnation. The Opler-Boas bacillus is usually found with low free hydrochloric acid and lactic acid and, in association with blood, constitutes strong presumptive evidence of carcinoma. This bacillus is found in about 80 per cent of cases of gastric carcinoma and only rarely in non-malignant conditions, one of which is dilatation from benign stenosis of the pylorus. The presence of protozoa in the stomach contents is suggestive of non-obstructive carcinoma.

Following the extraction of the residuum, the Ewald meal is given, with the tube still in the stomach. Every fifteen minutes after the meal has been ingested 10 cc of the gastric contents are withdrawn. Normally the stomach should be empty in two hours after an Ewald meal, and, such being the case, eight specimens are secured. In addition to the routine chemical examination, microscopic examination of each specimen is made. Microscopically, the evidence mentioned in connection with the study of the residuum is looked for, and the degree of starch digestion is noted. In hyperchlorhydria, digestion of starch is considerably impaired, because salivary digestion, which is due to pytalin, stops as soon as food enters the hyperacid stomach. In the presence of subacidity, salivary digestion may proceed indefinitely, depending of course upon the degree of subacidity.

As a result of the chemical examination the curve of acidity is now plotted; and for practical purposes only five curves, such as described by Lyon,[1] need be considered. Even these five, be it remembered, are only suggestive and in no sense pathognomonic, because they are not consistently found.

Type I may be called the normal curve,

because it shows a condition which is frequently encountered in perfectly healthy persons. The apex, 40 to 60 per cent acidity, is reached in from 60 to 75 minutes, and a return to normal fasting values is reached in 120 minutes. This type of curve is found in early catarrhal conditions of the stomach, which are indicated by mucus and pus of gastric origin in the fasting stomach contents, and mucus and perhaps blood in the digesting stomach.

Type II is referred to as the extragastric curve because it is generally found to be due to reflex irritation from pathology outside the stomach, such as cholecystitis, appendicitis, and duodenal ulcer. This curve rises steadily to 90-120 during the two-hour period, or until the stomach becomes empty. It is sometimes called the curve with a terminal ascent, and is the type of curve which Moynihan[2] found in 85 per cent of his cases of duodenal ulcer. When 50 per cent or more of the total acidity is made up of free hydrochloric acid, ulcer may be strongly suspected.

Type III, the achylia curve, is that in which no free hydrochloric acid is found at any time. This is most often seen in late malignancy and in the severe anemias, either primary or secondary, but especially in primary anemia. It is also found in cholelithiasis of long standing. Differentiation of the type of achylia is determined by the microscopic picture, and by testing the gastric filtrates for the organic acids (especially lactic acid), for the ferments, and for soluble albumin. Benign achylia may be determined by the hypodermic injection of histamin, which has been shown recently to stimulate the secretion of free hydrochloric acid.

Type IV, the stepladder curve, is characterized by the smooth ascent being broken by successive drops in both free hydrochloric and total acids, unassociated with biliary regurgitation and followed by a rise to a still higher level than that which preceded the fall. This type, though not often seen, is usually of grave significance; it is generally preceded or followed by hemorrhage from an active ulcer, according to Lyon.

Type V, delayed digestion curve, shows a primary small rise followed by a drop, and then a practically normal curve. In certain cases of this type the free hydrochloric acid does not appear until the secondary rise. The first rise in acidity in this curve is probably due to psychic secretion, and the second rise to the normal hormonic secretion. "This latter, which should normally pick up and carry on the psychic stimulus, is here delayed, and this permits a wearing off of the psychic stimulus and a consequent drop in acid values."

The wide variation in these different types of curves is the main reason why they cannot be considered of any real value by themselves. After all, gastric analysis is simply a measure of gastric work performed, motor and secretory, in the fasting and in the digesting states; and a measure of the motor work of the stomach is of greater value than a measure of the secretory activity. Actual acid values mean but little, and all the secretory evidence secured from gastric analysis is of less value when taken alone than are the results of other methods of examination, particularly history taking and *x*-ray examination. It is a great mistake to depend on acid values; any acid curve is a fragile reed upon which to lean in making a diagnosis. At best the character of an acid curve is only suggestive; no type of curve is pathognomonic for any particular gastric condition, normal or abnormal. There are many disturbances affecting the gastric secretion which prevent the drawing of any accurate deductions as to gastric pathology. The physical and psychic factors, the character of food eaten, focal infection, reflex disturbances from other organs, dysfunction of the endocrine glands, blood dyscrasias, all must be taken into account. Hypersecretion is merely indicative of irritation, which may be intragastric, as from an ulcer, or extragastric (in which case it is usually in the near vicinity of the stomach), as from adhesions or from cholecystitis. It has also been shown that the content of the stomach is not a homogeneous mixture and that different degrees of acidity are found in differ-

ent portions of the contents. For this reason mixing of the stomach contents by means of the syringe and physical manipulation, and then rapid aspiration, are necessary in securing extractions. Hyperacid conditions are usually present in the hypertonic stomach of the type found in the active, athletic person with a short broad chest. Low acid conditions are usually found in the opposite, or hypotonic type. It has been shown by Carlson[3] and others that actual hyperacidity—in the sense of a greater than normal acidity—never exists in health or disease. Any pathological deviation in acidity is generally, if not always, in the direction of subacidity. Acid is normally secreted in the stomach in a concentration of 0.4 per cent. According to Carlson, when higher concentrations than this are found they are probably due to delayed emptying of the stomach with prolonged and accumulated secretion. Sensations ordinarily attributed to hyperacidity are due to disturbances of motility. Friedenwald has shown that the acidity of gastric secretion is not materially influenced by alkaline therapy, and inasmuch as subacidity is generally present when so-called hyperacidity symptoms are complained of, alkalies are not indicated. Indeed, alkaline waters have been shown actually to increase gastric acidity.

Most authorities look on hyperacidity as a local condition, but as representing a change of more general character—especially a disturbance of sodium chloride metabolism. In this connection the work of Molnar and Csaki[4] is of interest. These investigators found that the sodium chloride excretion was markedly retarded in hyperacid patients as compared with non-hyperacid. In those with hyperacid complaints, in whom gastric normal or subacid values are found, the same retardation in sodium chloride excretion was observed as in hyperacid patients. A retardation of sodium chloride excretion was also observed in persons with normal acidity after large doses of atropine or alkalies; small doses of the same medicaments (1 mg. novatropine twice, or 1-1.5 gm. sodium bicarbonate three times) not only produced a favorable effect on hyperacid complaints, but promoted sodium chloride excretion. Retarded sodium chloride excretion in hyperacid patients was also observed when sodium chloride was given intravenously. These authors conclude that hyperacidity is not a simple disease of the stomach, but represents a more general change, especially a disturbance of sodium chloride metabolism.

Baird and Campbell[5] emphasize the importance of estimating total chlorides in the fractional test-meal samples. They say that it is the best measure of determining the amount of gastric digestion. These authors observed that under normal conditions the chloride curve continues to rise after the acid curve is falling or has become level. This, they claim, is due to neutralization by alkali, in which the pyloric portion of the stomach plays an important part. Their experiments indicate that the acidity curves may suggest deficient secretion, while the chloride curve of the same subject shows that the apparent hypochlorhydria is due to excessive neutralization, not associated with regurgitation of bile. On these premises it is being commonly accepted that the measure of the degree of gastric digestion may therefore be better secured by estimating the curve of the total chlorides in the gastric secretion. The chlorine values are more constant than the acid values: for instance, in the case of ulcer, they are consistently increased; and while hyperacidity is present in 42 per cent of ulcer cases, it is nevertheless also present in 45 per cent of perfectly normal individuals. In gastric ulcer, therefore, a low sodium chloride diet is more scientific than alkaline therapy. Wiener[6] of Berlin found in carcinoma of the stomach with a low acidity (and consequent low chlorine values in the form of free hydrochloric acid) a *high total* chlorine. This he considers of value in differential diagnosis. The increase in the total chlorine is believed to be due to an increased flow of sodium chloride into the stomach as a result of destruction of areas of the normal gastric mucosa.

Recently it has been determined that there is a correlation between the percentage of

free hydrochloric acid in the gastric juice and the times of elimination of neutral red by the gastric cells. By injecting neutral red intramuscularly and noting the time that elapses until it appears in the stomach, a fairly definite idea of the degree of acidity can be arrived at. Normally the dye appears in the stomach in fourteen to seventeen minutes. In the hyperacid stomach it appears in eight to ten minutes, while in a subacid stomach it does not appear for twenty-two to thirty minutes after injection. In achlorhydria it does not appear at all. This method promises to yield a more accurate and dependable estimate of gastric function than can be determined by the acidity, which is so easily influenced by the various conditions mentioned.

Leaving the question of hyperacidity, mention may be made of a test that appears of value in some cases of achylia: this is the Woolf-Junghans test for estimating the soluble albumen present in gastric extracts. It has been shown that the albumen or protein curve runs fairly parallel to the free acid curve in benign subacidity or achylia such as is found in pernicious anemia, while in the achylia of carcinoma the protein curve soon leaves the acid curve and makes an abrupt ascent to a high level. Friedenwald found this test positive in 83 per cent of cases of carcinoma of the stomach. In the achylia of pernicious anemia it was negative in 86.5 per cent of the cases.

Simple benign achylia is often discovered by accident inasmuch as it frequently causes no symptoms and may be found in otherwise normal subjects. While it is quite compatible with health, it is not natural. Gastric juice above 20 per cent acidity has an increasing bactericidal power, and lack of it therefore permits bacteria and improperly digested food to enter the intestine, where they not only act as irritants but are broken down by bacterial action and give rise to various toxins. Certain of these toxins appear to have an affinity for red blood-cells, and for this reason Hurst and others believe that achylia predisposes to pernicious anemia. Histamin, which is one of these toxins, has been proved to stimulate markedly gastric secretion.[7] Intravenous injections of this substance may now be used in differentiating a true from a false achylia, though not without some risk. Achylia is a decided factor in the etiology of colonic disturbances and in the biliary stasis preceding gall-bladder disease. In all cases of achylia examination of the stomach contents for the stomach enzymes is indicated. A complete absence of free hydrochloric acid, associated with the absence of rennin and pepsin, is an invariable finding in carcinoma of the stomach, while absence of free hydrochloric acid associated with the presence of rennin and pepsin indicates a benign achylia such as is seen in pernicious anemia.

As regards the comparative value of the fractional and the single method of gastric analysis, it may be stated that the former procedure is commonly considered to be of more worth than the latter. By fractional analysis the secretory and motor activity of the stomach can be roughly determined at any one or at all stages of digestion, while by means of the single extraction method such activity is determined at only one stage. It is true that the contents of the stomach do not constitute a homogeneous mixture, and any one portion that may be removed is not strictly representative of the whole; in fact the variations in the acidity of specimens removed at the same time may range from 20 to 40 per cent. This wide variation may be overcome, however, by extracting the contents as previously described. When an anacidity is encountered in the single extraction method, the fractional method must necessarily be used or false conclusions will be reached. Friedenwald and Bryan[8] have demonstrated that among one hundred cases of gastric carcinoma 79 per cent showed achlorhydria if the examination of a single extraction were depended upon, while only 52 per cent showed achlorhydria by the fractional method. This simply means that whereas we invariably expect to find achylia in carcinoma, it actually occurs in only a little over one-half of the cases. The Ewald tube, furthermore, cannot remove all the stomach contents, and for this reason one is more likely to make erroneous

interpretations of secretory activity from isolated findings. As it has been aptly put, "the fractional method of study is to the single extraction method as a moving picture is to a single snapshot."

Examination of the duodenal contents for the pancreatic enzymes—lipase, amylase, and trypsin—is indicated in suspected pancreatic disease. Persistent low values in these enzymes indicate severe chronic pancreatitis, because the enzymic concentrations furnish an index of the activity of the external secretory function of the pancreas. In obstructive jaundice determination of enzymic concentrations is a help in localizing the site of the lesion and in the differential diagnosis between its benign and malignant character.

While gastric analysis might profitably be employed as a routine in the complete examination of a patient, it is particularly indicated in any patient presenting gastrointestinal symptoms. Although I have minimized the value of the secretory findings, I desire just as strongly to emphasize the importance of the other findings. Examination of the fasting stomach contents, particularly, is one of the most valuable methods of diagnosis at our disposal, and an intelligent interpretation of the total evidence secured from a fractional examination of the stomach contents may be comfortably relied upon in establishing a diagnosis of disease of the gastrointestinal tract.

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Local Insulin Reactions.

In the *Lancet* of May 30, 1925, LAWRENCE states that every attempt should be made to make the daily injection of insulin as comfortable and easy as possible, and in this connection the following points may be useful: It gives far the least trouble and is entirely satisfactory to keep the syringe and needle sterile in spirit in a metal case or glass test-tube. A non-irritant skin disinfectant must be found for every patient in whom variations to different antiseptics occur. The pain of the puncture can be minimized by the use of fine and sharp needles, by inserting the needle as nearly at right angles to the skin as possible, thus traversing little skin, as this is the painful part of the injection. Usually by moving the point of the needle lightly over the skin it is easy to find a spot which is quite insensitive to the prick and where the injection can be made quite painlessly, because it avoids the nerve-endings for pain. The sting of the insulin is usually very slight, and it can be made less by pinching somewhat vigorously the skin and underlying tissues into which it is being injected. The best sites for injection are the parts of the body where the skin is loosest and which are not subject to pressure or to much movement in the underlying muscles. The calves are unsuitable because the skin is very tight over them, and the best places for self-administration of insulin are the front and outer aspects of the thights, the abdomen, and the lower part of the chest, where both hands can be used in the injection. The forearms and outer sides of the upper arms are also available when some one other than the patient is giving the injection. By these means the initial repugnance that many patients feel to daily injections soon gives way to the indifference of any easy habit.

Editorial

PERITONITIS OR APPENDICITIS.

Those readers of the GAZETTE who were in practice four decades ago will recall that so-called peritonitis was very common indeed, and not until Fitz showed that appendicitis was the cause of this condition in a large proportion of cases did the term primary peritonitis cease to be frequently used. Now we all know that peritonitis is never, to use an old-fashioned phrase, "idiopathic," that the invasion of the peritoneum by pathogenic organisms is the result of some lesion elsewhere; and the surgeon of experience to-day often opens the abdomen feeling assured that he is traveling the right path as to treatment, but nevertheless he is uncertain of the diagnosis until by means of his incision he discovers the cause of the inflammatory process. It is also true that the more skilful the surgeon the more frequently does he hold his hand if the peritonitis is in an advanced stage until nature has had an opportunity to wall off the infection. It took a long while for medical men to appreciate this fact, but it has now been borne in on them with sufficient force to result in the saving of many lives.

An important point is to remember, however, that peritonitis may arise without any primary infection of the appendix, as through the genital tract in women or the gall-bladder in either sex.

In the Proceedings of the Royal Society of Medicine of London there is to be found a most interesting and instructive discussion upon pneumococcal peritonitis carried on before that body by a number of able physicians and surgeons. While many of the cases which are reported concern the incidence of pneumococcal peritonitis in children, nevertheless what was said applies largely to all such cases, and Cameron, while admitting that an overwhelming preponderance of females suffer from this infection, nevertheless states that boys are often attacked, and in infancy he thinks both sexes suffer in equal numbers. In some instances the infection reaches the peritoneum through the blood-stream and is, therefore, what might be called a secondary infection, just as the lesion in the lung called pneumonia is the result of such a blood-stream condition.

The typical history apparently is one of slight illness with colic and diarrhea preceding by some days a mild chill. The onset of peritonitis is announced by sharp exacerbation of pain, high fever,. possibly delirium, an expressionless face, a rapid pulse, and abdominal rigidity. Thus Cameron cites a case of a girl of nine, who after about a week of general wretchedness became suddenly extremely ill on a Saturday, with intolerable abdominal pain. A laparotomy was not done until Tuesday, when a pneumococcal peritonitis was found. The child died on Thursday.

It is needless to dwell upon reports of other cases, except to point out that oftentimes there is no preliminary stage of wretchedness, the abdominal pain coming on with the suddenness of acute appendicitis; but this important point is worthy of emphasis, namely, that whether the pain is preceded by preliminary symptoms or whether it strikes first, in nearly every instance the evidences of systemic shock are more severe than in appendicitis and the results are apparently more frequently mortal.

In some cases the pneumococcal peritonitis, by complicating or speedily following pneumonia, endocarditis or pericarditis, may be considered as an evidence of a secondary infection; or, in other words, the history of the patient having suffered from such a malady may cause the physician to think of this pathological state, but in the symposium upon this subject to which we refer, chief attention was paid to that group in which,

apparently, the peritoneal site is primary. In these cases, whether they be primary or secondary, the peritoneal infection may be localized or generalized. Whether the localized cases should be treated with the conservatism with which most cases of localized peritonitis are now handled, or whether surgical interference is wise if promptly resorted to in all cases, may be said to be as yet undetermined. This, however, may be said with confidence in its truth, namely, that in pneumococcal peritonitis, whether it be localized or generalized, each case must be a law unto itself, and the more experience the physician has and the more nicely he balances his judgment as to whether to operate or not to operate, the more likely will the patient recover.

TETRABROMPHTHALEIN AS A DIAGNOSTIC AGENT.

Those who have been following medical literature carefully during the last year are well aware that tetrabromphthalein and the sodium salt of tetraiodophenolphthalein have been used by a number of investigators in an endeavor to find a valuable aid in the diagnosis of pathological conditions in the gall-bladder.

It has been found that these substances are eliminated by the hepatic pathway and that their presence in the gall-bladder casts a shadow under the *x*-rays which is of some diagnostic value. It would appear, however, like many other tests, that when it is positive it may be relied upon with some degree of assurance, but that when it is negative, such a fact is by no means positive evidence that the gall-bladder is normal. Indeed, it would appear that further research is necessary before a compound is obtained which is more satisfactory from the diagnostic standpoint, and equally or more important one which possesses no toxic action either at the point of injection or so far as vital functions are concerned.

Recently, Baumgartner and Jewett have reported a series of cases in which they used these preparations, which are given intravenously, and in their cases were administered in one single dose, although others have suggested that the total amount be given in divided doses. Some reporters have thought that the test would prove correct in 95 per cent, and that the shadows with the iodo salt are as good as with the brom salt. Again, that with the iodo salt the general reaction has been less severe than with the brom salt.

One of the reasons why we have already expressed the opinion that some improvement in this method would have to be arrived at, is the fact that such injections are not entirely innocuous; thus, in one of the cases reported by Baumgartner and Jewett there occurred a very severe reaction characterized by pain, nausea, loss of sphincter control, and semicoma, which symptoms, however, lasted only a short time, and which they think may have been due to the fact that the reagent had been on hand for several months. In another case some of the injected fluid escaped into the perivenous tissues, producing considerable local pain and swelling with fever, but no ulceration. In still a third patient there was thrombosis of considerable extent of the vein which received the drug, and in four others there were very slight reactions, such as momentary flushing.

Out of the eight patients considered in this summary it will be perceived seven of them suffered from symptoms which were more or less undesirable, and that in still another case the injection did not result in the gall-bladder being visualized, although subsequent operation revealed that this viscus was enlarged and thickened. In two cases the gall-bladder was found normal according to the dye test, but was not well visualized until twenty-four hours after the injection.

Both Baumgartner and Jewett along with Carman and Councellor agree that cases with cardiovascular conditions should not be subjected to this test, and that disagreeable reactions are more apt to occur in nervous and neurotic people.

Only one case of thrombosis occurred with the brom salt, and four out of five got such a result with the iodo salt.

They quote Carman and Councellor as stating that injections into the cephalic vein are more likely to be followed by reaction than injections through other veins, but give no explanation for this. Taking it all in all, their experience with this method of diagnosis does not seem to have been very fortunate. They believe, however, that it possesses definite value in obscure cases. They also think that further experience is necessary before it can be definitely determined that the iodo salt is certainly less safe than the brom compound.

Still more recently Smithies and Oleson have reported two cases of aseptic irritative phlebitis following the intravenous injection of sodium salt of tetrabromphenolphthalein. In one instance such an extensive and extending thrombosis developed as to require surgical interference to prevent the spread of the thrombus to larger vessels. As a result of their experience they believe that the calcium salt of tetrabromphenolphthalein is preferable to the sodium salt, and they also urge that special caution in making these injections be adhered to in patients who have had recent residence in hot climates but who originally were northerners.

DISTILLED WATER AS A POISON.

To the average person, water, unless it contains pathogenic organisms or poisonous substances in solution, is undoubtedly considered as a most innocuous substance, and it is generally believed, even amongst those who have more knowledge than the average citizen, that distilled water is still more harmless.

We have on more than one occasion called attention to the fact that distilled water may contain substances capable of producing a very sharp reaction, and have emphasized the fact that when a person who is in jeopardy is to receive an intravenous injection of salt solution it is not alone sufficient that the water should be called "distilled"; as, for example, in an editorial quoting an interesting paper on this subject which recently appeared in the *Boston Medical and Surgical Journal.*

Within the last few weeks, Babcock has reported in the *New York Medical Journal and Record* a death following the accidental intravenous injection of distilled water, the water having been injected as normal saline. The quantity used was not very large, for he tells us that even although adrenalin had been added to the fluid, after 125 cc had entered the vein the patient developed convulsive respiratory movements, then ceased breathing and became pulseless; nor did the heart respond to massage through the open abdominal wound. He boldly introduced a needle into the heart and withdrew bits of soft clot, and then injected 40 minims of a 1:1000 adrenalin solution into the heart and continued cardiac massage, shortly after giving 100 minims of adrenalin solution and 30 minims of digalen directly into the left ventricle without producing any response. During this time 550 cc of saline solution so-called, with adrenalin, entered the vein, but a chemical examination of the so-called saline solution showed no trace of chlorides, and it was found that through an error, as we have already stated, distilled water had been used.

Out of nine flasks in the operating-room labeled "salt solution," seven of them proved to be only distilled water.

On discussing the possible causes of death, Babcock points out that syphilitic aortitis, spinal anesthesia, emotion, and operative shock might all be considered as possible causes of the death of the patient, but he thinks that the altered blood which was obtained from the heart and also from the jugular vein indicated that none of these causes were the factors involved. He excludes spinal anesthesia because thirty-five minutes had elapsed between the anesthetic injection and the onset of very grave symptoms, and he uses his paper to emphasize that the utmost precaution should be taken to be sure of the contents of containers before they are used for intravenous injection, and also to insist upon the fact that distilled water is not a harmless preparation.

COPPER SULPHATE AS A LOCAL APPLICATION FOR PHOSPHORUS BURNS.

It has been thought for many years, and stated in many books upon therapeutics and toxicology, that phosphorus when swallowed should be antidoted by the administration of a solution of copper sulphate. About thirty years ago Thornton seemed to show, from certain investigations that he carried out, that when copper sulphate was administered to animals which had received toxic doses of phosphorus such animals died more rapidly than did animals which received the poison without the antidote; in other words, the copper sulphate was a more rapidly acting poison than the phosphorus. It is possible that the doses of copper sulphate employed at that time were unnecessarily large and that further research might have revealed that doses of the antidote which were far less in amount might have been efficacious without producing a toxicity of their own.

Phosphorus poisoning produced by the ingestion of white or yellow phosphorus has, for various reasons, become almost unknown, but in its place there has developed an external toxic effect produced by phosphorus coming in contact with the surface of the body where it fumes or blazes and produces intense and more or less widespread destruction. It is probable that as phosphorus is being employed more and more in the production of war material, such burns will be met with not infrequently. Thus we learn from a paper by Walton, who is Lieutenant-Commander in the Medical Corps, United States Navy, that while certain things have been excluded as permissible in war time, white phosphorus is still allowed, and even if no war is being carried on, it may be handled in troop maneuvers and in industrial plants.

Various methods have been used to extinguish such fuming or blazing phosphorus when on the surface of the body. If the patient was immersed in water, the blazing was resumed on emerging from the bath, and ordinary oxidizing agents seemed to act too slowly.

The point is that Walton has found that a one-per-cent solution of copper sulphate applied upon a gauze pad immediately arrests the fuming or blazing, leaving in its place a heavy black film of copper phosphide. Walton claims that such an application of a one-per-cent solution is effective in half a minute, and recommends that large pads of absorbent cotton should always be on hand along with a one-per-cent copper sulphate solution so that they can be instantly applied, after which the extinguished phosphorus can be removed mechanically and the skin treated upon the lines commonly employed in the management of burns.

CANCER CONTROL.

Occasionally the profession is led to hope for the next step in the control of cancer, *i.e.*, the discovery of its underlying cause, by reports of promising results of research work. This is particularly true of Nuzum's pronouncement to the effect that he has been able by repeated inoculations of a micrococcus isolated from early breast cancer to produce a metastasizing malignancy in man and in lower animals. The thoroughness of his study and his absolute belief in its accuracy excited not as large attention as did, for instance, tuberculin when it was first brought out, but induced many workers to visit him, to inspect his methods, and in the main to come away unconvinced. It is to be noted he makes no large claim, not even to the effect that cancer is parasitic in origin. He simply states facts as he sees them, which perhaps is one reason why his pronouncements carry, if not conviction, at least hope to many. The disadvantage of publications suggesting a further step in the etiology of cancer and necessarily a hope of a cure is incident to the fact that the dread of the knife, once dominant and justly so, still obtains, and that given such a hope many patients will postpone recourse to surgery, radium and *x*-rays beyond the time when these may be curative. That they are

curative has been proven beyond doubt, and that cancer is curable in its early stages has equally well been shown.

In this relation a communication from Wilson (*Minnesota Medicine*, volume 8, No. 2, 1925) is of especial interest. Wilson points out the increasing death-rate from cancer, suggests that it is especially an affliction of the civilized, though not unknown among all peoples, and, from the standpoint of heredity, puts much weight on the elaborate, accurate and prolonged research of Dr. Maud Slye, of the University of Chicago. This investigator, using mice, crossed cancer strains with each other, cancer strains with non-cancer strains, and non-cancer strains with non-cancer strains, studying the results in many generations, indeed so many for each strain that were these experiments attempted on the human they would extend back to some thousands of years. She has found some strains for twenty generations never developing cancer. Other strains died habitually from cancer. In other strains cancer was occasional, but did occur in accordance with the recognized laws of heredity. Wilson notes that a satisfactory conclusion reached by Slye is to the effect that susceptibility to cancer is recessive, tending to fade out, while resistance to cancer becomes dominant, becoming stronger in successive generations. Since the principles of inheritance are biologically the same, practical application of this study would seem to be that marriage should not take place when both contracting parties are from the families in which there has been a high cancer incidence. It would also seem fair to infer that cancer incidence in the family of one of the contracting parties should not be a bar to marriage when there is no such history in the family of the other.

Bearing on the parasitic or non-parasitic nature of cancer, Wilson expresses no opinion. He holds that a failure to demonstrate its transmissibility, as for instance to surgeons or nurses, or as the result of marital relations, does not negative its parasitic nature. He doubts the authenticity of the few instances in which there has been reported a successful implantation of cancer from one person to another. It has not been possible to transplant from one species of animal to another, or even from one variety of animal to another, as instanced with transplants which while 100 per cent successful in Plymouth Rocks cannot be made to grow and metastasize in other varieties of chickens. After the cancer has been successfully transplanted a number of times the percentage of takes may be 100. Transplantation with the original and apparently spontaneously developed tumor is difficult and often fails.

The diet of animals has been found markedly affecting the success of transplantation. Wilson believes, as the result of laboratory studies and clinical observation, that there is no evidence that meat diet has the faintest influence in rendering an individual, community or nation susceptible to cancer. Examples of vegetarians having cancer are found among the Japanese and the Indians.

As to the use of vaccines as a means of securing immunity against cancer, Wilson holds that there is neither clinical evidence nor laboratory proof that these have such an effect.

Wood of the Crocker Institute is quoted as saying that no difference has been demonstrated in cancer cell from the normal cell, except that the former has a greater capacity for growing, from which he concludes that there can be no hope of influencing the growth of cancer cells by any biological means which do not affect the normal cells to even a greater degree. As opposed to this there may be cited clinical evidence as to certain selective and destructive action of *x*-rays and of heat upon the cancer cell.

It cannot be denied that cancer frequently develops at the seat of prolonged irritation, but it is equally true that it grows where no such previous irritation could be demonstrated, and that in the vast majority of cases where there is such irritation cancer does not develop. The injection of irritating chemical substances, and especially lipolytic dyes, will produce a tissue overgrowth indistinguishable from that of cancer, but

it does not metastasize and undergoes a process of spontaneous involution.

Fibiger is quoted to the effect that by feeding rats with cockroaches infested with a parasite the latter produced true cancer of the stomach wall.

As to blood chemistry, Luden of the Mayo Foundation has shown that cholesterol is greatly increased in cancer patients. Börst, who produced cancer by continued irritation of a rabbit's ear, noted that such cancer developed more rapidly if the animals were given cholesterol. He further noted that when cholesterol was withheld tumors of the ear disappeared.

Smith's work on plants by which he was able to produce tumors by inoculating with cultures of tumors in other plants is quoted and would be of value, excepting that he has produced similar tumors in plants without the use of any injections of bacteria, but merely by stimulating them by chemical vapors.

As to Nuzum's experiments, Wilson, while expressing admiration for their conscientiousness, holds that they cannot be accepted as final since there are too many other possible explanations of the results obtained.

From the therapeutic standpoint he considers that chronic irritation of any locality should be avoided; that persistent ulcerations or lumps should receive prompt attention; and holds that cancer, in place of being incurable, is largely under the control of the medical profession, provided the patient comes at an early stage to the doctor. He quotes Agnew of the University of Pennsylvania, a man of huge experience, who thirty-five years ago stated he had never cured a patient with cancer of the breast. At the present day the cures are certainly more than 50 per cent, provided the patient is seen early. It should be noted that practically no patients were seen early by the surgeon in Agnew's day. The surgeon was consulted only when the tumor had become so large that it annoyed by its bulk, and when there had developed wide lymphatic extensions. The mortality of such cases is nearly as great to-day as it was thirty-five years ago.

MANAGEMENT OF ACCIDENTS IN THE TREATMENT OF SYPHILIS.

From the present concept of the treatment of syphilis—*i.e.*, doses of mercury and of arsenic as large as the patient can tolerate and repeated at frequent intervals—it is not surprising that what are called accidents may occur; rather it is a source of wonderment that these are not observed in larger numbers, particularly in the form of chronic poisonings.

Doubtless there are many more instances of acute or subacute poisonings, or of reactions which in so far as the patient is concerned amount to poisoning, than appear in literature, since the drugs are often administered by those inexperienced in their use, and in doses which should not be given to individual patients. While this remains true, even in the most experienced hands untoward results cannot always be avoided. There is such a thing as idiosyncrasy against one or both of the drugs commonly used. Aged people as a rule do not stand arsenic well. Pronounced infections of the eye, central nervous and cardiovascular systems call for a cautious approach. Those with acute conditions in important organs should receive preliminary treatment with mercury and perhaps the iodides before the more powerful arsphenamines are exhibited. Generally in case of doubt the arsenic should be preceded by a course of mercury, which in turn must be carefully watched. Moreover, those with kidney lesions and imperfect elimination do not well tolerate these drugs.

As to the injecting an arsenic preparation into cellular tissues due to the needle not entering, or transfixing the vein, the appearance of tumefaction at the point of injection should suggest at once the stopping of the injection. The pain incident to this accident may be relieved, according to Sutton (*American Journal of Syphilis*, Vol. IX, No. 2, 1925), by an infiltration of one or two cc of a 10-per-cent solution of sodium hyposulphite, and the application of hot packs.

Sutton states that the nitritoid reaction is expressed by shortness of breath, difficulty in swallowing, and flushed face. Intramuscular injection of 1:100,000 solution of adrenalin repeated in five minutes, with, of course, the stopping of the arsenical injection, usually brings relief. To prevent repetition of this reaction Sutton advises the hypodermic injection of one-fiftieth of a grain of atropine twenty minutes before arsenical solution is administered, or one-tenth of the total dosage, administered slowly, followed in forty minutes by the rest. A combination of these methods is suggested, also it is wise to change the arsenical preparation.

As to toxic skin eruptions, Sutton holds they are seen more frequently after the use of sulpharsphenamine than is the case with other preparations. When the patient loses weight, becomes nervous and irritable, with subsequent itching of his skin, care should be exercised in the further administration of arsenic preparations. For the relief of the skin eruptions, which vary from erythema to a marked edematous dermatitis, accompanied by diarrhea and followed by exfoliation, graduated doses of sodium thiosulphite, given intravenously, are advised. Direct application of equal parts of lime-water and olive oil with one-half to one per cent phenol is helpful. The first dose of thiosulphite is 0.15 gm. in 10 cc of freshly distilled water; this dosage is increased daily until one gramme is given. The appearance of jaundice calls for the immediate cessation of specific drugs. With the development of frank nephritis mercury must be stopped and a low protein and salt-free diet advised. For severe stomatitis, accompanied by tenesmus and bloody stools, in addition to cleansing washes by the mouth, intravenous injections of thiosulphite are advised, together with increase in the intake of fluids. The headache following spinal puncture can usually be either ameliorated or avoided by keeping the patient in bed twenty-four hours thereafter, with the head low, and by giving plenty of fluids and codeine sulphate.

Sutton holds that every skin eruption occurring during treatment should be regarded as suspicious until proved otherwise. He believes that thiosulphite is the most valuable drug in the presence of late serious reactions. Preparation should be made to give adrenalin promptly when intravenous injections are employed. When patients become irritable and nervous this is usually a sign of overtreatment.

It might be thought that our knowledge of syphilis and its treatment is standardized. We have undoubtedly a better control of the disease than before the discovery of its parasitical cause and the acquisition of the knowledge which if universally applied by the medical profession and by the laity could completely prevent its transmission. There are large questions still unsettled, such as the protective value of the primary local reaction, if any; the possibility of complete cure; the systemic reactions by which a symptomatic cure is accomplished; the reasons for the selective action of the parasites in individual cases upon the bones, vascular system, the nervous system, or the skin; the value of intensive treatment in the late stages; the particular function of iodine. Indeed we are at the very beginning of knowledge sufficiently complete to enable us to insure with some degree of certainty a safe and permanent cure in the individual case. We have abundant knowledge to prevent this disease from being, as it is now, one which affects about 5 per cent of our population.

Progress in Therapeutics

Medical Therapeutics

The Treatment of Chronic Stomach Conditions.

WHITE in *The Journal-Lancet* for June, 1925, points out that ulcers of the stomach when chronic offer opportunities for exercising judgment, first, as to whether or not the treatment is to be medical or surgical, and, if surgical, what type of such treatment is best employed for the particular case. It is his belief that a simple uncomplicated ulcer of the stomach should be given the advantage of a thorough trial with accurate medical management.

Accurate medical management means almost always that the patient must go to the hospital for three to four weeks; that he must remain in bed; that the physician must know that the acidity is controlled by the regular use of an adequate amount of alkali and food, and by actually pumping the stomach every day or nearly every day and testing the stomach contents to see that the acidity is controlled. The stools should be examined for blood quite regularly, especially if the ulcer was bleeding before treatment was instituted. If one knows that the acidity has been controlled and that the occult blood in the stool is not from bleeding about the gum margins of the teeth or other extraneous source—in other words, that the ulcer continues to bleed after careful management—this phenomenon speaks for, but may not prove, a malignancy at the site of the ulcer and is then one of the indications for surgical procedure. If the opportunity for an accurate medical management is not available, or if the management is not or cannot be carried out over a long period of time, at least a year, then the patient with an ulcer of the stomach is better off if he is operated on by a good surgeon.

Medical treatment has the advantage of having no mortality and almost no morbidity from the treatment itself as opposed to surgical operation, and a high percentage of cures, but it may not cure some cases that surgery would cure, and his point is that selection of cases for medical or surgical treatment is what should be done and not to adopt an attitude of a routine procedure of either medical or surgical treatment.

Definite rules cannot be formulated, but certain general principles may be followed. An ulcer treated accurately medically which has a tendency to recur is probably better treated surgically.

Other complications of ulcer in which surgery is indicated are obstruction at the outlet which does not subside on medical management, but he has seen several cases in which there has been an ulcer at the outlet giving obstruction, noted clinically and by *x*-ray, which has gradually but very definitely been relieved by accurate medical management. If there is not real evidence of relief of the obstruction in a comparatively short time and quite complete relief in three weeks of treatment, surgery is probably indicated, and gastroenterostomy relieves many of them. Obstruction by an ulcer at the outlet of the stomach is caused either by an inflammatory swelling about the lesion or by a pylorospasm or by an actual tissue narrowing. The inflammatory swelling and the pylorospasm respond quite readily to the influence of control of acidity. Actual tissue narrowing does not. A good custom is to place patients with an obstruction of the outlet of the stomach due to ulcer on medical management. Often some relief is obtained in a few days. In many the relief of obstruction is complete in three weeks. If there is not a rather definite relief in three weeks surgery should be advised.

The above discussion has to do with the principle that an ulcer of the stomach would heal, as would an ulcer on the surface or other part of the body, if it were not for the corrosive action of the gastric juices;

that is, that the portion of the stomach wall which has lost its protective coat of epithelium is acted upon by digestion. This digestion can take place only in the presence of free hydrochloric acid. The purpose of the treatment, medical or surgical, is to prevent the digestive action on the sore spot.

In the medical management this is prevented by neutralizing the acid by alkaline powders and milk and cream. This brings us to the consideration of the type of surgical procedure.

Gastroenterostomy has been for several years a much-used means of treatment for peptic ulcer and accomplishes its purpose by hastening the emptying of the stomach, thereby shortening the time that the ulcer is subjected to the action of the digestive juices. It has resulted in the cure of many ulcers. On the other hand it has been followed by some mortality, some morbidity, and some failures to cure. The mortality varies with the surgeon or clinic, and the statistics have varied with the true mortality and the diligence and honesty in their keeping.

In the hands of a good surgeon the mortality of gastroenterostomy should be low.

Resection of the ulcer should be the operation of choice where this is feasible. This is for theoretical and practical reasons. It has the advantage of complete removal of the diseased area, thus lessening the probability of recurrence and of malignancy developing. Ulcers that have existed for a long time, and especially the untreated ones, sometimes become large and perhaps indurated. These are much better resected than treated medically or by gastroenterostomy, both on account of the fact that if they should heal eventually it would be at best a slow process and also on account of the possibility of malignancy starting at the site of the ulcer.

Perforation is more apt to occur with an acute ulcer than with a chronic one. When a chronic ulcer perforates it changes classification from a chronic stomach condition to an acute one, and, of course, immediate operation is called for.

Hemorrhage from an ulcer is usually better treated by non-operative methods—morphine in large enough amounts to keep the patient very quiet, and fluids by proctoclysis, hypodermoclysis, or even intravenously. Blood transfusions may be necessary. Hemorrhage is apt to continue or recur, because after a clot forms it is digested and allows further bleeding. This can be handled usually by giving alkali in sufficient amounts and frequency to keep the stomach content alkaline. The morphine aids by keeping the patient quiet. When the bleeding is very profuse immediate operation to secure the bleeding point may be necessary, but it does not become necessary in a very high percentage of cases.

Hour-glass constrictions of the stomach are very apt to require operative treatment, and the type of operation will vary with location, degree, and type of constriction.

One thing we know, but are apt to forget, is the importance of focal infections in the etiology and therefore in the treatment of ulcer. We should impress the patient with the importance of removing all infectious foci if possible.

The Treatment of Hay-Fever.

COKE in the *British Medical Journal* of May 23, 1925, states that cauterization of the nose is very useful for two purposes. If on examination of the nose before the hay-fever season commences one finds that the turbinals are covered with boggy swollen mucous membrane, cauterization should be undertaken to reduce them by scarring. The other use of the cautery is to touch the mucous membrane lightly and destroy some of the nerve endings and so lessen the extreme sensitiveness present. This should be done over the turbinals on either side, and particularly on the septum anterior to the bony outlet of the nose. With a blunt probe other tender spots can be searched throughout the whole area. He is in the habit of doing this cauterization about the middle of May, thus allowing just sufficient

time for healing before the season commences.

With reference to symptomatic treatment, the patient should be placed in a cool dark room. The admittance of fresh air from the outside should be limited to the minimum, for the whole air is heavily laden with pollen. For the same reason the windows should be kept closed at night unless the warmth of the weather makes this impossible.

The effect of the direct sunlight is so provocative of sneezing that dark glasses should be worn if the patient does not stay indoors. These should fit closely round the eyes, after the manner of motor goggles. Broad-rimmed hats and caps are often helpful.

The patient is greatly assisted by taking steps to prevent the pollen passing on to the mucous membrane of the nose. Unfortunately, the worse the patient's hay-fever is the more difficult it is to touch the nose without causing a paroxysm of sneezing. Simplest, perhaps, is a tube of vaselin with a long nozzle out of which sufficient can be squeezed just inside the nose. This can be pushed further up the nose by pinching the organ with the finger and thumb, assisted by sniffing it up. Liquid paraffin or olive oil may be used very frequently in a coarse spray.

Various medicaments may be added to paints and sprays to meet the symptoms. Adrenalin and menthol will constrict the blood-vessels and so lessen the swelling of the mucous membrane, allowing the orifices of the various sinuses to regain their potency. Cocaine and its substitutes reduce the intense irritation of the nerve endings in the nose, and constrict the blood-vessels, especially cocaine. Oily and greasy vehicles for these drugs soothe the mucous membrane and prevent fresh pollen getting to it.

Similar drugs may be used for the eye symptoms. In educated people, who can be trusted not to use the drugs to excess, the instillation of a few drops of cocaine (4 grains) and adrenalin (3 drachms to the ounce) will not only help the eyes, but, by passing down the lacrimal duct, will also allay the trouble in the nose. Used in an atomizer these may be sprayed up the nose, and also into the eyes. In prescribing these drugs some estimate must be made of how often the patient will use them and, more particularly still, the kind of spray he will use them in, likewise the viscosity of the ingredients of the solution used.

A search should be made for any microbic invaders which are adding to the patient's discomfort.

Considerable comfort is experienced by dipping the whole face into a basin of cool water at bedtime. If sufficient salt is added the eyes may be opened and washed in this. Keeping the lips and glottis closed, some patients manage, by expanding the buccal cavity, to draw the solution into the nose and wash that at the same time. Such a washing often allows the patient to fall asleep with ease and comfort.

The Value of Quinine Bihydrochloride Combined With Pituitary Extract in Labor.

RYAN in *The Practitioner* for June, 1925, states that having delivered more than one thousand women in childbirth, and having always striven to shorten labor by every conceivable means, he thought it might be of interest to record his deductions as to the method which he found most successful in the majority of cases.

In the following remarks he deals only with normal vertex presentations, for abnormal cases always present their own specific complications. His aim is to indicate a method which will cause rapid and full dilatation of the os; it is then left to the practitioner whether he applies his forceps or not—meddlesome midwifery has its disadvantages, but to some its advantages are regarded as a blessing.

Having made certain that no obstruction to delivery exists, and then having considered it wise to hasten delivery, he suggests two alternative treatments. First, to give castor oil 1 ounce, followed by a hot drink,

and two hours later an enema of soap and water; one hour later a cachet of quinine bihydrochloride grs. v, the latter to be repeated every two hours till grs. xv have been administered. If labor does not come on strongly, hot fomentations applied over the abdomen usually bring on strong labor pains.

When the os is the size of at least half a crown (but not before), he gives a deep intramuscular injection of pituitary extract, 1 cc. Full dilatation usually occurs speedily with an uneventful delivery.

A second suggestion is that instead of giving the quinine in cachet form by the mouth, a 1-cc ampoule containing grs. v of quinine bihydrochloride should be given intramuscularly once only, the castor oil and enema being given as usual.

The idea in not giving pituitary extract in the early stages of the first part of labor is based on the fact that pituitary throws the longitudinal fibers of the uterus into strong contraction, the circular muscles are only dilating slowly, and the result is a slight dilatation of the os, with a following temporary inertia. The quinine seems to act as a more lasting tonic to the longitudinal fibers, and prepares the way for the pituitary extract. At all events the use of both has always, in his own experience, shortened labor to a very considerable extent.

[Some obstetricians believe that quinine increases the danger of postpartum hemorrhages.—ED.]

The Use of Natural and Artificial Sunlight in Private Practice.

MYERS in *Minnesota Medicine* for June, 1925, states that he desires to make it clear that he does not believe that heliotherapy in itself is sufficient in the treatment of any case of tuberculosis. However, when carefully administered with the other therapeutic procedures indicated in each individual case he has found it of tremendous value. He has become convinced that heliotherapy has a fourfold value. First, it acts as a tonic. It has been shown to change the blood picture and probably the blood chemistry in a manner favorable to the patient. Second, it induces the patient to rest quietly while the exposure is being made. When the periods of exposure are long this period of rest becomes an important factor in the treatment of the patient. Third, in addition to the sun bath the patient gets an air bath which is of unquestionable value. Fourth, it is a tangible form of treatment—the patient sees the skin becoming pigmented and feels definitely improved from time to time.

Not infrequently by the administration of heliotherapy it is possible to keep a tuberculous patient on the dietetic and hygienic treatment for months after all treatment would otherwise be abandoned. Therefore, the physician who employs heliotherapy will be able many times to secure an arrest of the tuberculous process and a restoration of the working capacity, whereas without heliotherapy no better than a condition of quiescence could be secured.

Milk Parenterally in Arthritis.

In the *Medical Journal and Record* of June 3, 1925, EIDELSBERG states that in 1921 he showed that often, following injections of milk intramuscularly, there was a reduction in blood-sugar level, which to begin with frequently was somewhat above the normal. Pemberton had already pointed out that many cases of arthritis were associated with a definitely decreased sugar tolerance, and also showed how removal of a focus of infection, if followed by improvement or cure, was associated with an increase in sugar tolerance, the curve approaching the normal.

He then turned his attention to the study of the relation of what Pemberton showed, and his observation of the decrease in blood-sugar level in many cases of arthritis, following the injection of milk. In cases showing improvement, if a decreased sugar tolerance existed, an increase in tolerance often went hand in hand with the improve-

ment. Incidentally, the lack of uniformity in results, and the often peculiar curves, must be accounted for in part, at least, by the hurried or delayed sugar absorption in some cases, and the presence of metabolic or endocrine diseases in others, which would of course upset the curves.

In the light of this we can have a rational explanation of the low carbohydrate intake and the restricted diet, and, among other things, of how milk parenterally aids arthritis.

He asks, Why the frequent observation of improvement following an intercurrent infection, as fever, a long journey, any excitement, administration of potassium iodide or thyroid substance, and now thyroxin? Pemberton suggests that these measures, among others, hasten the body metabolism. What is the effect on the metabolic rate of milk administration parenterally? As was expected, the injections frequently gave a fever, more or less severe, often absent; and increase in pulse rate, also often absent; and frequently an increase in the metabolic rate. The cases showing the combination of fever, leucocytosis, increased pulse rate, and an increase in the metabolic rate invariably gave the best results.

These are only several of the ways and means of the action of proteins and other substances producing so-called protein shock, but they help to explain the enigma, and remove some of the empiricism hitherto associated with this form of treatment.

He. has given in all since 1920 several thousand (two thousand six hundred) injections, in about two hundred and fifty cases. One is too often disappointed by the results, but then how often do all our methods of procedure and therapy fail us! Even progression is sometimes not halted. Five cases have definitely regressed from what one would term an advanced state; fourteen patients, mostly early cases (five to ten months' duration) have been cured; 107 patients improved in varying degrees; a number have ceased progression, even though not improved; and there have been many, many failures. Too often the pathology is extensive, the disease extremely malignant and progressive in nature—frequently associated with endocrine and metabolic disturbances, ankylosis, atrophy, exostoses, and what not—and cure out of the question. The underlying pathology remains—really unaffected. Any improvement, any aid is welcome. Cures are not to be thought of, and should never be promised. Then, and then only, is any improvement welcome and aid a blessing.

In his conclusions he adds an explanation of why removal of foci of infection fails to aid many cases of arthritis.

An explanation of why all forms of treatment fail in many cases is suggested due to secondary metabolic and endocrine changes, and to extensive pathological changes.

Observations have shown a decided increase in sugar tolerance in arthritis following milk injections.

Following milk parenternally there is an increased metabolic rate in many cases, associated with the improvement.

Hard Water as a Possible Factor in Urinary Concretion Formation.

Myers in the *Journal of Infectious Diseases* for June, 1925, states that oxamide fed to rabbits produced only a slightly larger amount of solid material in the urinary bladder when the rabbits received hard water than when they were given distilled water.

Glass beads placed in the kidneys of dogs produced concretions with both a hard and a distilled water intake.

Glass beads in the kidneys of albino rats failed to produce concretions with either type of water.

No definite relationship was observed between hardness of the water intake and the amount of calcification of cartilage blocks in the bladders of rabbits in conjunction with either a high or a low calcium diet.

Finally he asserts no evidence has been found proving hard water to be an etiological factor in urinary concretion formation.

The Relief of Catarrhal Deafness.

In *The Practitioner* for June, 1925, DUNDAS-GRANT states that with regard to the treatment of the catarrh the physical condition of the nose is the first local consideration, and obstructions and discharges claim attention to start with.

Nasal obstruction would afford material for a small volume. As a rule the patient's opinion as to its existence may be accepted, but it may be checked by making the patient breathe up and down, with the mouth shut, through the two nostrils together and then with each nostril separately, the opposite one being closed by means of the thumb applied from below on to the external naris, not by compressing the ala. If obstruction is present its nature must be determined by means of a nasal speculum and suitable illumination. It is astonishing how much may be seen if the tip of the nose is tilted up without a speculum and light is thrown in. There is often beautifully seen a deflection of the septal cartilage on one side with, on the other, a dislocation of the lower edge of the septal cartilage into the nasal orifice. A very common form of obstruction in cases of simple catarrh or of vasomotor rhinitis is a smooth swelling of both inferior turbinated bodies. If this subsides under the action of cocaine or adrenalin, the inference is that it is a simple turgescence. To break the circle (irritation keeping up the turgescence, turgescence favoring irritation) this has to be combated, and the galvanocautery point after cocaine (or some substitute) is often required, but it is, of course, a two-edged weapon, and is perhaps best left to the expert. A harmless substitute for cocaine and the galvanocautery is an ointment consisting of:

℞ Anesthesin, gr. xx;
Vaselini, ʒij;
Sol. adrenalin hydrochlor, min. xx;
Parolein, ʒij.

This can be brushed into the nose by means of a camel's-hair pencil. To most patients this is quite unirritating, and it produces a shrinking of the turbinated body of considerable duration. Antipyrin has a similar action, but causes pain unless its application is preceded by that of cocaine or, better, eucaine B. It might be prescribed in the form of two sprays:

℞ Eucain. lactat. B, gr. x;
Aq. camphoræ, ℥ss.
Sig: Spray No. 1.

℞ Antipyrin, gr. iv;
Aq. dest. ad, ℥ss.
Sig.: Spray No. 2, to be used five minutes after No. 1.

A certain amount of vasoconstriction combined with a sedative and protective effect on the irritable mucous membrane may be obtained by an oily spray containing:

℞ Chloretone, gr. vij;
Menthol,
Camphoræ, āā gr. iv;
Ol. cinnam., min. iv;
Ol. lavand. dulc., ad ℥j.

Many of his patients have reported diminution of their tendency to catarrh following the administration of the appropriate vaccines, a multiple stock preparation appearing to be as efficient as an autogenous one. It is probable that each year the vaccine, though repeated, is less active in its effect, but the respite obtained may afford time for practicing other anticatarrhal methods.

Of these, the modified cold bath is one of the best. It consists of a discreet and rapid sponging of the whole body with cold water while standing in a hot bath, beginning with the arms and finishing with the feet.

The inhalation of the vapor of creosote seems to cut short some colds, or at least to give some alleviation. It is less disagreeable if combined as in the following "compound cinnamon drops":

℞ Ol. cinnam.,
Ol. citronell, āā min. xij;
Ol. pin. sylvest.,
Spt. chloroformi, āā ℥jss;
Creosoti, ℥iij.

This may be sprinkled on a handkerchief laid on the pillow, or may be inhaled from a pocket inhaler, or (as in pulmonary tuberculosis) in a Burney Yeo's perforated zinc respirator.

Eucalyptus or eucalyptol ointment has also a considerable vogue.

When aromatic ointments, especially those containing menthol, are applied to the interior of the nostrils, they are soothing to the mucous membrane, but often irritating to the skin. Any of the material adhering to the skin lining the vestibule of the nostril should, therefore, be carefully wiped away for fear of giving rise to "eczema." This recalls a very important caution with regard to nasal discharge which proves obstinate in spite of saline nasal washing. The discharge is in some cases an exudation from an eczema of the skin lining of the vestibule of the nose. This is made worse by saline douches, which should therefore be avoided, while an ointment such as a combination of equal parts of boric and zinc ointment is substituted for them. It is, therefore, important to examine this part without the usual solid-bladed nasal speculum, or indeed without any speculum at all.

In the absence of this source of discharge a generally useful method of clearing the nasal fossæ is required. An unirritating lotion may be snuffed up, sprayed, or syringed.

When both nostrils are to be cleansed, a metal, china, or india-rubber cup adapted to fit the nose may be used, and the simplest method of all is to snuff the lotion from the palm of the hand.

The following is a useful formula for a pleasant and suitable cleansing lotion:

℞ Sod. salicyl.,
Sod. chloridi, āā gr. 48;
Sod. biborat., gr. 96;
Glycerini, min. 72;
Aq. menthol ad ℥vj.

Sig.: A teaspoonful in an ounce (two tablespoonfuls) of warm water for the nose.

He has seen cases of simple chronic rhinitis, and many of mucopurulent rhinitis, following acute catarrh, clear up after a short course of this washing.

Syringing with the same solution may answer well, but the injection seems to offer more risk of entrance into Eustachian tubes than the snuffing, which draws the liquid past them.

A coarse spray with a fine point is open to less objection, but on the whole the snuffing nasal douche seems to answer most requirements, including safety, efficiency, and reasonable pleasantness.

It should be remembered that many cases of hoarseness are due to a chronic form of laryngitis caused by the inhalation of pathological secretions from the nose, and that nasal irrigation often brings about a cure. Even in tuberculous laryngitis the washing away of the nasal discharge is of undoubted benefit. Grant recalls asking some patients, who showed unexpected improvement, when the improvement set in. The answer was emphatically that it was from the day he made them wash out the nose.

Studies on the Carbohydrate Metabolism of Infants.

In the *Journal of Laboratory and Clinical Medicine* for June, 1925, TISDALL, DRAKE and BROWN state that a procedure has been devised whereby blood-sugar determinations may be made with the use of only 0.2 cc of blood. The procedure is based on the Shaffer-Hartmann method. The results obtained are usually accurate within five per cent.

The average fasting concentration of blood sugar in twenty approximately normal infants was found to be 0.087 per cent. In twelve cases of marasmus the average concentration was 0.070 per cent. Values as low as 0.050 per cent were obtained in the latter group.

When 5-, 10-, and 15-per-cent solutions of glucose are given interstitially to normal infants the blood-sugar curve reaches its height about half an hour after the injection is given. This rapidity of absorption

is of practical value when an intravenous injection cannot be given readily.

The rise in blood-sugar concentration in normal infants is more marked after the interstitial injection of 10 per cent glucose than after the interstitial injection of 5 per cent glucose. The fall in the blood-sugar curve after interstitial injections of glucose occurs with remarkable rapidity.

The intravenous injection in normal infants of large amounts of glucose—i.e., one gramme of glucose per pound of body weight—is followed by a rapid diminution of the blood-sugar concentration, after the preliminary rise. One hour after injection the concentration may be actually less than that found before the injection.

Infants with conditions such as acute intestinal intoxication and fermentative diarrhea are unable to utilize glucose introduced parenterally with the same rapidity as normal infants. A study of the effect of insulin in these cases is in progress.

Attention is again directed to the tremendous ability of the normal infant to utilize glucose introduced parenterally.

The Preparation and Clinical Tests of an Antistreptococcus (Scarlatinal) Serum.

In the *Journal of Laboratory and Clinical Medicine* for June, 1925, FERRY, PRYER and FISHER state that in order to increase the potency of this serum and at the same time eliminate as far as possible urticarial rashes which usually follow in a certain proportion of cases injected with horse serum, it has been concentrated by the precipitation of the globulins according to a method somewhat similar to the preparation of other well-known concentrated serums. Agglutination tests show that this concentration has increased the titer of the serum about six times. While this does not necessarily imply that its protective value has increased to that extent, it is, more or less, an index of the concentration of the antibodies present. Taking into consideration the results usually following the concentration of antidiphtheric and antitetanic serum, this increase in antibody content is also about what should be expected. So far the few cases upon which this concentrated serum has been tested have given extremely favorable results with 10-cc doses. These cases will be reported later.

They conclude that an antistreptococcus scarlatinal serum has been prepared with both antitoxic and antibacterial properties.

This serum has proved of value as a therapeutic agent in scarlet fever.

Diabetic Treatment Simplified.

In the *British Medical Journal* of June 6, 1925, EVE states that few will deny, least of all general practitioners, that the treatment of diabetes has now become very complicated, and, in his opinion, there is a real danger of the main issues becoming fogged in a cloud of bewildering details. The main issues are: (1) The quantity of sugar excreted day by day; (2) the presence or absence of ketones; (3) treatment by regulating the quantity and quality of the diet, or by giving insulin if dietetics prove inadequate; (4) the blood sugar (in special cases).

The ground can be cleared by distinguishing clinically between cases of simple glycosuria, which are common and usually unimportant, and stubborn diabetes, which is uncommon and serious. His paper deals with genuine diabetics who are living at home.

As to insulin, the main practical points are:

1. It is something which somehow enables a diabetic to burn up sugar like a normal person, but does not enable him to store it as glycogen.

2. It can in this way cause the blood sugar to sink to a dangerously low level (hypoglycemia). This danger can be guarded against if the patient always carries about with him eight large lumps of sugar (1 or 2 ounces of barley sugar—Maclean) and promptly eats them all if he feels queer after an injection of insulin. Two grammes of glucose are supposed to

keep busy one unit of insulin; from which he reckons that eight average lumps of sugar would act as antidote to 15 units of insulin.

3. Insulin is given two or three times a day, just before a chief meal, which, if possible, should contain one ounce of bread; 10 to 50 units daily is the usual range of dose; more is seldom useful.

4. The patient can be taught to inject it into the pinched-up skin of the thigh, under weekly supervision. A trained nurse is better, but a doctor cannot be at hand three times a day before meals.

5. Insulin has to be acid; in a few subjects this causes painful lumps. It is said that neutralization in the syringe by sterile sodium bicarbonate solution of proper strength prevents this irritation and does not impair the action of the insulin.

6. As to blood tests with insulin, he has rarely found them helpful, for it is unattainable in private practice to keep the blood sugar normal. One dares not even keep the urine quite free of sugar in insulin cases.

7. The risk of giving insulin in unsuitable cases will be practically eliminated without blood tests (*a*) if one first tries to cure all cases by diet alone; (*b*) if ketones are present, and abundant sugar, insulin is surely needed; (*c*) leaky kidneys (renal glycosuria) are a real but uncommon danger. These cases may be recognized by their uncanny failure to improve with diet, by their good health, by the absence of ketones, and by the absence of glycosuria three hours after a good starchy meal. A blood sugar will decide the matter by showing a low renal threshold for sugar. So also, he thinks, would the absence of rhythmic oscillation in a weekly starvation chart, but he has seen no such case in the last four years. To insist that we should test the blood of every glycosuric patient before giving insulin so as to avoid this fairly obvious bugbear seems to him absurd.

Eve does not recollect seeing a single ill effect attributable to insulin, while the benefits are notorious. But if in an emergency one is fearful of causing hypoglycemia he can guard the insulin with sugar, as above.

Ketones, such as acetone and diacetic acid, are half-oxidized fats. Their presence in the urine is revealed by the nitroprusside test or the ferric chloride test; he prefers the latter, as the former is too sensitive and becomes a scaremonger.

If the addition of two drops of liquor ferri perchloridi fortior to the urine produces a dark-brown color, then ketones are present in dangerous amount and must be got rid of, lest coma supervene. Ketones are far more pregnant with danger than sugar, and are often produced by too strict a dietary. They indicate that the fats in the system are not being properly burnt up. Now how can these poisonous half-oxidized ketones be thoroughly and harmlessly burnt up? By giving more carbohydrate food, for the fats are burnt in the furnace of brightly burning carbohydrates. But the special weakness of the diabetic is that he cannot burn up his carbohydrates properly. Hence, to get rid of ketones, it is often needful not only to give extra carbohydrate, but also to give insulin, which has the mysterious property of enabling the diabetic to burn up sugar like an ordinary person. So that if ketones appear we must watch for coma, ignore the sugar in the urine, and treat the much greater danger by giving alkalies freely and more bread. And if one finds that large doses of alkali fail to make the urine alkaline, then the peril of coma is menacing indeed. Ten grains of sodium bicarbonate should alkalize a normal urine; but best give the ketosis patient 20 grains. An hour afterwards boil and cool the urine in a test-tube and test with blue litmus paper.

Glucose and Insulin in Obstetrics.

WILLIAMS in the *Virginia Medical Monthly* for June, 1925, states that in considering the symptoms of toxemia of pregnancy and its modern treatment it is best to separate the cases into two classes, the mild and the severe. In the mild cases we have nausea and vomiting principally; in the severe ones, the symptoms are more devastating and there are signs of albumin, acetone and diacetic acid in the urine. The acetone and diacetic acid, evidences of a general ketosis,

are there because there had been consumed and metabolized an inadequate supply of carbohydrate, and as a result the body forces, in self-defense, attack the protein and fat.

In the mild cases, carbohydrate is fed in suitable quantity and at frequent intervals. On account of the growing fetus, hypertrophied uterus and placenta, more carbohydrate is required for the body needs. Proteins and fats are reduced materially if these have been used excessively by the patient. Usually the patient will improve rapidly and soon be on the way to recovery; but if the case is more severe and the patient is vomiting incessantly, and albumin, casts, acetone and diacetic acid are present, the patient is starved for twenty-four hours, 800 cc of 5-per-cent glucose and 2 per cent sodium bicarbonate is given by proctoclysis, the stomach is lavaged with the stomach tube, and two ounces of magnesium sulphate left in the stomach at the completion of the lavage. In prolonged vomiting there is a reversed peristalsis and the magnesium sulphate changes the direction back into its normal downward course. Intravenously glucose is given, 300, 500, even 1000 cc of a 10-per-cent solution. There are disadvantages to giving normal salt solution, for sodium chloride is usually retained in the blood in these severe cases far above normal amounts. This is obvious if one pauses a few moments to reflect. If the systolic blood-pressure is above 185 mm. mercury, it is a capital idea to remove 300, 500, or even 1000 cc of blood. The object of withdrawing blood is the removal of toxic products, rather than to merely lower blood-pressure. After the preliminary twenty-four-hour starvation, food should be given orally. It is better to give solid food than too much liquid bulk if the vomiting is still severe, as solids are retained when liquids are vomited. These solids should be carbohydrate: crackers, toast, cakes, peppermint candy, cold bread, while a small quantity of cream of tartar lemonade in the proportion of a drachm to a pint respectively is a very important adjunct. Cream of tartar has a favorable effect on the alimentary canal and kidneys. The proctoclysis of glucose and soda can be repeated every eight hours and the intravenous glucose injected every twenty-four hours. It is very likely that with the adequate supply of carbohydrate absorbed from the mouth, bowel, and blood stream, the patient will show immediate and continuous improvement, but if she does not, there is no other course left than to bring about a therapeutic abortion. There is no doubt that many cases aborted should be relieved by palliative and conservative measures.

During the last few years the intravenous route for furnishing medicines to a patient has grown in popularity tremendously. In his mind the treatment of syphilis by the various salvarsans did much to popularize this route. In the course of human events it is quite natural that men should concentrate their minds on the feasibility of administering an easily absorbable food directly into the blood stream. Glucose was naturally selected.

A number of physicians in giving glucose intravenously have reported reactions. It is not necessary to obtain a reaction, and to avoid such every precaution should be taken. The glucose should be of the best quality; Merck's Highest Purity is that preferred by many; it is dissolved in freshly distilled water, filtered, then sterilized. If these precautions are followed carefully, a reaction will be a rare occurrence.

Concerning the more serious illness—eclampsia. The patient vomiting, comatose, convulsive, blood-pressure is high, there is acidosis. What is to be done? Instantly two widely diverse methods of treatment enter into our thoughts—the radical and the conservative. In the radical method, forcible dilatation of the cervix is resorted to and a rapid delivery consequently effected. This used to be the method "par excellence," but in more recent years the pendulum has swung to the conservative plan, with tabulation of better results. Various conservative plans are practiced in the world at large, but the Stroganoff, Dublin and Williams features embody what are apparently

best. He believes it discreet to appropriate the salient, stellar points of each and combine all three methods. The patient should be in a room to herself with the attendance of a special nurse, if possible, morphia gr. ½ hypodermically should be given and repeated in the same or smaller dose according to the then existing need; if there is much frothing at the mouth, atropine sulphate gr. 1/150 can be profitably included in the hypodermic. The patient is kept on her side in order that any mucus present in her mouth will run out, consequently lessening the danger of aspiration pneumonia; gastric lavage is done and two ounces of magnesium sulphate left in the stomach just before removing the stomach tube. A soapsuds enema is given, and by proctoclysis 5 per cent glucose and 2 per cent soda is allowed to run in slowly; 200 to 500 or even 1000 cc of blood is removed. Whitridge Williams advocates the removal of large quantities of blood, and says that generally we remove too little. If the blood-pressure tumbles to around 100 mm. of mercury and the pulse becomes concomitantly fast, he has not found that a real disadvantage; 250, 500, or even 1000 cc of a 10-per-cent glucose solution is given intravenously, and repeated every twenty-four hours for the time being. If the patient is doing badly and no improvement is obvious after a painstaking and thorough trial of the conservative method, it is expedient to bring on a therapeutic abortion and deliver in the easiest manner. As a rule, however, this course can be averted if statistics are correlated and followed. As the patient improves, feed her carbohydrates, as outlined previously. As a result of this carbohydrate metabolism, important changes are occurring in the liver warehouse. The depleted supply is being replenished and the destructive process is halted, even stopped completely, unless necrosis has already ensued.

It is conjectured that the rate of absorption of the glucose from the blood stream would serve as a criterion of liver improvement. If the glucose is quickly absorbed and converted into glycogen, it would mean that the liver has not lost its function; and, conversely, if the sugar does not promptly disappear, it can only point out that the liver cells are so badly damaged and its function of storing glycogen so greatly restricted, even lost, that the patient was in a very serious condition and a lethal exodus may be expected to ensue.

Regarding the method of treatment as especially appertains to glucose and insulin. Up to 1000 cc of a 10-per-cent glucose solution is convenient to use, as with it the patient receives a much needed supply of fluid along with the glucose. The solution should be run in slowly and kept warm. About fifteen minutes after the injection has been started, ten units of insulin is given hypodermically and repeated at intervals. One unit of insulin causes the utilization of from 2 to 3 grammes of glucose. If 100 grammes of glucose is given in 1000 cc of water, 30 units of insulin could be safely given. For safety's sake, an excess of glucose should be given to prevent a possible hypoglycemic reaction or insulin shock.

Intraperitoneal Saline Injections in Infancy.

In the *Virginia Medical Monthly* for June, 1925, LASERSOHN states that having decided that a condition of anhydremia is present, and that it needs to be relieved, the question comes up as to how it would be best to bring the water content up to normal in as quick and effective and safe a way as possible. On account of the vomiting, and because of the small amount of water that such sick and weak infants take by mouth anyway, this route can be used very little and with hardly any effect. Some advocate giving water by mouth by gavage, but when vomiting is present and there is great prostration this method is found to be not satisfactory. The insertion of a tube through the nose or mouth to the stomach, and the giving of water by the drop method in this tube, is also inefficient in many cases because of the vomiting, and because of the necessity of keeping the tube in the nose or mouth for a prolonged period.

The condition calls for a lot of water immediately. Rectal administration, on account of the diarrhea and slow limited absorption, is obviously very ineffectual. Fluids given subcutaneously are, in severe cases, almost imperceptibly absorbed; in others very slowly absorbed, and then only in small amounts. In milder cases from 50 cc to 100 cc of saline can be put under the skin of the scapula with some benefit, but in most cases, on account of the poor circulation and the poor absorption, one finds the results not very striking, so that in severe cases requiring quick restoration of the blood volume this method is not effectual.

Intravenous injections are sometimes impossible, and often very difficult, and not without danger. It is, too, rarely possible to inject a sufficient amount of saline intravenously to give the desired effects without throwing too great a burden on the already impaired circulation. For these reasons, and because of its advantages and safety, saline is given intraperitoneally. First used by Blackfan and Maxcy at the suggestion of Howland, who saw it used on the service of Professor Garrod at St. Bartholomew's Hospital in London, the method has found wide-spread application and enthusiastic support.

The area of injection is the lower abdomen in or close to the midline. After cleansing the skin with iodine and then alcohol the needle, connected with the receptacle containing the saline, is inserted into the abdominal cavity at an oblique angle through the linea alba, or, better still, just to the right or left of this line. As the skin and subcutaneous tissues are raised with the left hand, the needle is pushed into the wall with the right hand until the sense of resistance which the abdominal wall gives has been overcome. A needle such as is ordinarily used to take blood for the Wassermann test does very well. The sterile graduated glass container, into which the warm saline has been put, is now raised three or four feet above the abdomen and the saline is allowed to run in.

The infant apparently suffers some pain when the needle is put in, and a less amount when the needle is removed, but very often falls asleep while the saline is running into the abdominal cavity. Upon removal of the needle a sterile piece of gauze, held firmly in place by a wide piece of adhesive, is applied to the puncture wound. The needle is withdrawn when the abdomen becomes slightly distended (that is, when the abdomen is on a level with the costal margins); should too much saline be put in, as evidenced by respiratory embarrassment, some of the fluid, occasionally as much as 20 per cent, can be removed by lowering the cylinder or flask containing the fluid to a level below that of the abdomen. In this way, by siphoning, fluid drop by drop or in a slow stream runs back into the flask. The pressure that has been produced by the occasional injection of too much fluid can often thus be removed.

Further Studies on the Effect of Iodides on the Human Nitrogen Metabolism.

In the *Journal of Pharmacology and Experimental Therapeutics* for June, 1925, GRABFIELD and PRENTISS tell us that they have studied the effect of sodium, lithium, calcium, potassium, strontium and magnesium iodides, Lugol's solution, and "Sajodin" on the nitrogen metabolism of normal human subjects.

It has been found that the exhibition of any of these drugs increases the urinary nitrogen excretion of subjects in positive nitrogen balance on a constant protein intake.

When sodium, lithium, strontium or magnesium iodides are exhibited the increase in nitrogen output is immediate.

When calcium or potassium iodides are given the increase in nitrogen output is delayed; in these experiments it occurred after the three-day period of drug administration.

Changes in the non-protein nitrogen of the blood correspond to urinary changes, *i.e.*, falling if the rise in urinary output is immediate, and rising until the increased excretion begins when the latter is delayed.

A Precipitating and Neutralizing Scarlatinal Antistreptococcus Horse Serum.

In the *Journal of Infectious Diseases* for June, 1925, ROSENOW reports that his experiments on toxicity and neutralization not only support the newer results obtained in scarlet fever by G. F. and Gladys H. Dick and by Dochez, but also show that great differences occur in the toxin-producing power of scarlatinal and non-scarlatinal strains of hemolytic streptococci, and, further, that certain strains possess this power to a high degree years after isolation. Moreover, they show that it is possible to produce in the horse a neutralizing serum by intravenous injection of dead and living hemolytic streptococci from scarlet fever, a result within expectations because of the demonstrated identity of the toxin in filtrates and that within the washed dead organisms. On the basis of Dochez's results, it may be that their efforts were successful, because the horse developed arthritis.

In the pig or hog (Chester White) was found what promises to be a suitable animal for determining the toxicity of filtrates from cultures of hemolytic streptococci and perhaps for the standardization of antiscarlatinal serums. Good keeping qualities of antiscarlatinal serums may confidently be expected, since specific precipitating and neutralizing properties were demonstrated in the serum prepared more than six years before.

The large amount of toxin produced by the three strains of hemolytic streptococci isolated in cases of postscarlatinal otitis media, which was neutralized by the scarlatinal serum, indicates that these strains would have produced scarlet fever in susceptible persons, and that immunity of the skin to the toxin does not necessarily mean immunity of the throat to infection by truly scarlatinal hemolytic streptococci.

Preservation of filtrates in the ice chest for six months markedly reduced their toxicity.

Identity of the soluble toxin produced by scarlatinal and certain non-scarlatinal strains seems certain, since both were neutralized by the immune scarlatinal horse serum, by the serum from persons immunized with scarlatinal filtrates (the Dick method), and by convalescent scarlet fever serum. The fact that the neutralizing principle (antitoxin) was removed from the scarlatinal serum by the washed bacterial bodies of both types of hemolytic streptococci, and that the "endotoxin" within the heat-killed bacterial cells was neutralized equally in both, is further proof of the identity of the soluble toxin and endotoxin of scarlatinal and of certain non-scarlatinal strains.

Treatment of Effusions in Artificial Pneumothorax.

In the *British Medical Journal* of June 20, 1925, HUDSON states that with regard to the treatment of pleural fluid he has come to the following broad conclusions:

When dealing with a serous effusion or a serous pleurisy, do not aspirate if it can possibly be avoided. The fluid will often reabsorb by itself, or may be aided by sweating the patient. If, however, it is a very big effusion, or is causing inconvenience and discomfort, or is not showing signs of disappearing after some weeks, then it should be aspirated and replaced with air, but it is a bad thing to irritate the pleura unnecessarily by needling. A simple serous effusion may easily be turned into a purulent one by frequent aspiration. At each aspiration the fluid is seen to get more and more turbid and finally to become pus. Another important maxim is not to interfere needlessly with an acute effusion—that is to say, while the temperature remains high; it is better to wait to see if the fever will come down, as it generally does except in infective cases, and to deal if necessary with the condition when it has become passive.

When removing effusions, if there is any suspicion of the lung underneath being infected with tuberculosis, always replace with air, thereby establishing a pneumothorax. Whether the fluid is absorbed or removed, careful watch should be kept by

x-ray examinations and air put in as the liquid disappears, to avoid the reëxpansion of the lung and the formation of adhesions which would render the continuance of the pneumothorax an impossibility.

When dealing with purulent effusions, aspirate and replace with air when necessary. Avoid washing out if possible; it is merely irritating to the pleura and has, he believes, no beneficial effect. Hudson has seen good results obtained by replacing in these cases with oil of gomenol (10 per cent) instead of with air. In acute infected cases, such as the two which he describes, there is really nothing to be done except to drain the pleura, after attempts at aspiration and washing out, etc., have failed, and then, if possible, to continue with a plastic operation at a later date. He has seen one or two recoveries in these cases, but they are always very serious and very often fatal.

Auricular Fibrillation in Exophthalmic Goitre.

The *British Medical Journal* of June 13, 1925, reports that DUNHILL, at the meeting of the Inter-State Post-Graduate Assembly of America which met in London, spoke on the surgical treatment of exophthalmic goitre from the point of view of auricular fibrillation. He stated that he began the operative procedure in these cases —the patient having been got into the best possible condition by the physician — by ligating one artery in order to test the reaction to operation; then, after a rest of ten or twelve days, another vessel was ligatured, followed by another long rest; after which one lobe of the thyroid was removed, and later from one-half to two-thirds of the second lobe. The cases were put on quinidine, but quinidine could not get them regular while the thyroid toxin was still working on their heart muscle. Quinidine was able to act on the heart muscle to restore it to regularity, but there was a toxin in the thyroid which was able to interfere with the neuromuscular heart mechanism and make it fibrillate, and so long as that continued quinidine was of no permanent avail. The chief danger was in operating on the wrong type of case. Of 26 patients he had operated on, 3 had died, and 2 others had had only one lobe removed, and still fibrillated on exertion; the remaining 21 had never fibrillated from the time the operation was completed, and the records went back to 1919. The treatment is lengthy—each case should take from six to nine months for the medical and surgical procedures.

Pneumoperitoneum in the Treatment of Tuberculous Peritonitis.

MERCER in the *Virginia Medical Monthly* for June, 1925, states that the simplest, safest, and most logical method of treating tubercoulous peritonitis with ascites consists in removing the fluid with a cannula followed by injection of filtered air into the peritoneal cavity by means of a pneumothorax apparatus.

This method can be repeated as often as necessary until all fluid disappears, and without harmful effects upon the patient.

This method is worthy of universal practice among patients with ascitic tuberculous peritonitis, as it offers a better prospect of cure within as short a time as celiotomy, heliotherapy, and *x*-ray without the dangers of a surgical operation and its sequelæ.

The Duration of Life After Operation for Cancer of the Breast.

In the *Lancet* of June 6, 1925, WYARD after discussing statistics says that if cancer is primarily a local disease, therefore it may be said that when local it is early, whatever the size or exact histological nature of the tumor. It is late as soon as it reaches the lymphatic glands. Therefore the earlier the disease at the time of operation the greater the possibility of completely eradicating it. The very earliest glandular infection enormously reduces the chances of cure.

The actual average duration of life after operation is 4.6 years, but since some (9 per cent) of the patients are still alive, and

others (9 per cent again) died of diseases other than cancer, it is certain that the true average, as to cancer, is more than this, and probably approximates to five years.

The average duration of life after operation is greater by two years than that of unoperated cases from onset to death. (The normal duration of unoperated cases averages three years.)

He believes the age of the patient does not influence, one way or the other, the prognosis as regards ultimate survival after operation.

The Intravenous Use of Gentian Violet in the Treatment of Sepsis—A Report of Thirty-two Cases.

In the *Virginia Medical Monthly* for June, 1925, HORSLEY states that thirty-two injections were given to twenty-five patients, some patients receiving more than one injection. Of these twenty-five cases, eight, or 32 per cent, were cured; seven, or 28 per cent, were markedly improved; five, or 20 per cent, were only slightly improved; and five, or 20 per cent, were unimproved. He considers that five of these patients owe their lives to the intravenous use of gentian violet. There were no deaths from the injections, and only two reactions. The youngest patient was five years and the oldest sixty-six years.

Pure gentian violet may be obtained in powdered form. Coleman and Bell's gentian violet, and a German preparation put out by G. Grubler & Company, Leipzig, Germany, have been used with equally good results. Gentian violet can be used in 1-per-cent to 0.25-per-cent solution. He prefers a 0.5-per-cent solution. The solution should preferably be made up fresh for each injection, in either sterile distilled water or sterile physiological salt solution which has been dissolved in distilled water. He used the salt solution, for it happened to be more available. All needles, syringes and containers should be thoroughly rinsed with sterile distilled water or intravenous saline solution before being used. The accurately weighed gentian violet powder is then added to the proper amount of warm solution and gently mixed. This is allowed to stand for at least a half-hour. The solution does not have to be sterilized again, as it sterilizes itself. Just before use the dissolved solution is filtered through sterile gauze (six or more layers). The solution must not be allowed to stand in the syringes, as this will frequently cause them to catch or hang.

Care must be used in the preparation of the solution, in order to insure good results and no reactions. The intravenous use of any drug is not to be regarded as a slight matter. Especially is this true when such large quantities of an antiseptic solution as this are being used.

The average dose is 5 mgm. of gentian violet per kilogramme of body weight. The smallest dose given in this series was 3 mgm., and the largest 7 mgm. Cases are reported in which as large a dose as 10 mgm. has successfully been used. Care must be taken in infants and very old people, to whom it is probably best to give a small dose (2 to 3 mgm.) first, and on the following day repeat with a larger dose (4 to 5 mgm.) if there has been no reaction. It is often advisable to follow up the initial dose with subsequent ones at daily or two-day intervals, depending upon the amount of improvement and the general and local conditions.

One of the superficial veins of the forearm or elbow is preferable for the site of injection, though any available vein can be used. The same technique is used as in giving neosalvarsan or any other intravenous medication. The solution should be injected slowly, at least four minutes being taken to make the complete injection. If the solution is administered too rapidly, the patient will complain of a flushing sensation of heat, slight nausea, faintness, or a sensation of constriction of the throat or chest.

Of the thirty-two cases treated, only two did not have smears and cultures taken previous to treatment which showed a Gram-positive staphylococcic organism. Of these two cases, one was clinically a Gram-positive staphyloccoccic infection, for the

patient had multiple recurring boils. The second case was one of early left femoral phlebitis. Shallenberger, of Atlanta, reported at a meeting of the Southern Surgical Association, December, 1924, several cases of phlebitis treated successfully by the intravenous injection of gentian violet. He also stated that the most predominant etiological organism in phlebitis is a Gram-positive staphylococcus, but this organism is very difficult to culture from the blood stream. In phlebitis cases a therapeutic test or trial is justifiable, however, before attempting to culture the causative organisms. The following were the diagnoses of the twenty-five cases treated:

Infected wounds, 6.
Chronic suppurating sinus, 2.
General peritonitis, 3.
Multiple recurring furuncles, 1.
Multiple recurring carbuncles, 1.
Acute left femoral phlebitis, 1.
Liver abscess, 2.
Acute suppurative infection of the extremity, 2.
Chronic suppura'ive osteomyelitis, 1.
Chronic suppurative arthritis and osteomyelitis, 2.
Acute suppurative mastoiditis, 1.
Pyonephrosis, 1.
Empyema, 1.
Necrotic abscessed testicle, 1.

As mentioned above, there were five out of the twenty-five cases in which there was no improvement following the use of intravenous gentian violet. A careful study of these cases shows two chief reasons for no improvement. The most common is that of a mixed infection or one where Gram-positive staphylococci are either not present or not predominant. The second cause of failure is seen in those cases in which the dye in the blood stream cannot reach the infected focus, as, for instance, large areas where the blood supply is scant, as in sloughs, large pus pockets, chronic necrotic bone and joint conditions. Dyes will only affect those bacteria which are accessible to the blood or lymph streams.

In doses varying from 3 to 7 mgm. per kilogramme of body weight, properly prepared 0.25- to 1-per-cent solutions of gentian violet may be given intravenously with safety.

Horsley concludes that in sepsis where Gram-positive staphylococci are the sole or predominant etiological organisms and where the bacteria are accessible to the blood stream, the intravenous use of gentian violet is justifiable, indicated, and most beneficial.

Gastric and Duodenal Ulcer Variously Treated.

In the *Boston Medical and Surgical Journal* of June 18, 1925, GREENE states that a study of the results of medical and surgical treatment of gastric and duodenal ulcers at the Peter Bent Brigham Hospital has been made. Of 117 patients treated surgically and followed, 79.5 per cent obtained complete relief, 14.5 per cent obtained partial relief, 5.1 per cent obtained no relief, and 0.9 per cent suffered a hemorrhage. All those obtaining no relief underwent a second operation, which was successful in all the cases, four in number, who replied to follow-up letters.

In 259 consecutive operations upon elective and uncomplicated cases of gastric and duodenal ulcers, there were 5 deaths, a mortality of 1.9 per cent.

He asserts medical treatment is not without its dangers.

In choosing between medical and surgical treatment, the intelligence and ability of the patient to coöperate must be considered, as well as the clinical aspect of the case.

The Medical and Surgical Menace of Obesity.

In an editorial on this subject the *Boston Medical and Surgical Journal* of June 25, 1925, states that the danger of the development of diabetes toward middle age in those who have allowed a considerable increase in their waist measurement is now generally well known by the medical profession, thanks to those physicians who have made a special study of diabetes. The number of patients who are seen in hospital clinics, for various ailments, who are grossly overweight is increasing rapidly, so much so

that obesity can be justly regarded as a definite and very real cause for alarm. It is a common occurrence at present to find that many patients, especially women, with umbilical hernia are so obese that an "obesity cure" must be instituted before operation can be undertaken with a reasonable hope of cure. It is of interest that many cases of early breast carcinoma are in obese patients, this fact adding to the difficulties of the operation, and in some instances interfering with the kind healing of the operation site. At a certain hospital clinic at a recent date three women patients were seen within a few days of each other, their combined weight approximating seven hundred pounds.

That in certain cases the automobile is a definite factor in the production of obesity there can be no doubt. Walking has become a lost art.

One has only to observe the long line of automobiles parked about the large apartment houses in process of construction to verify this fact. The workmen ride to and from their work in automobiles, as do the conductors in many instances to their work on the trolley cars.

The physician is in a position to spread a much-needed propaganda against this menace, through talks to his obese patients, who may consult him for ailments not connected with this unsightly and dangerous condition.

Gastric Cancer and Gastric Ulcer.

In an editorial on this subject, the *Lancet* of June 13, 1925, points out that the matter is of much more than academic interest. It is of very great practical importance to the operating surgeon. Should he hold the belief that gastric ulcer is a material factor favoring the development of malignant disease, he must, logically, incline to excision in all cases in which it is technically possible, for the alternative treatment of gastrojejunostomy is not claimed to be invariably successful in promoting cicatrization even by its staunchest advocates. An interesting contribution to the subject has recently been published by Dible. He gives the results of an inquiry instituted by the Manchester Pathological Society. The material used was chiefly specimens removed at operations in the Manchester and Salford Hospitals. Of those 126 cases in which the clinical and naked-eye appearances pointed to simple ulcer, the histological evidence confirmed the diagnosis without a single exception. He points out, what other pathologists have drawn attention to, that near the edge of an ulcer down-growths of epithelium can be found which are not evidence of malignant disease, though they are apt to be interpreted as such. They were found in 32 per cent of the series under discussion and seem to be the result of the distortion of the tissues which takes place in the process of healing. In 23 cases diagnosed clinically as carcinoma and excised, and in which the lesions were at a sufficiently early stage to afford results capable of interpretation, in 19 no evidence was found in any way suggestive of preëxisting ulceration, and in nine the weight of evidence was against any causal associations of chronic ulcer with carcinoma. There were five cases in which, on histological grounds alone, the appearances might be taken to mean that malignant disease has been grafted upon a chronic ulcer. The author also points out that the site where cancer is most frequently seen, that is, in the vicinity of the pylorus, is not the most common site for chronic ulcer, which, in 73 per cent of the cases, is the lesser curvature. His conclusion is that transformation of a chronic gastric ulcer into a carcinoma is a possible but rare occurrence.

In contrast with that view is the recently expressed opinion of Finsterer. In 175 resected callous ulcers of the stomach, 27 per cent showed malignant degeneration, contrary to the experience of the Manchester surgeons. He says that it may be impossible to tell clinically, by *x*-rays, or on the operating table, whether an ulcer is malignant or not. In 145 gastric resections there were 31 carcinomas, where all the available evidence, until a histological examination had been made, pointed to the lesion being a simple one. The case his-

tories of five recent cases are given, and in two of these a Haudek's diverticulum on the lesser curvature was demonstrated early in the disease. It would seem that it is very easy to overlook the degenerating area of a chronic ulcer unless a searching microscopic examination is made. The end-results when such ulcers are excised, under the mistaken belief that they are simple, are disappointing. Local recurrence is not common, but in the majority of cases death occurs from metastases in the liver or retroperitoneal glands. Finsterer says that it is easier to recognize beginning malignant degeneration in a simple ulcer by a change in the clinical symptoms than to be certain of it on the operating table. From his extended experience he strongly adheres to the view that wide resection in simple gastric ulcer is to be regarded as a procedure prophylactic against future malignant disease. There is thus at the present time a frank divergence of view between surgeons of distinction on the best method of saving the patient's health and life in this common malady. It is essentially a matter which only a further collection of pathological evidence will decide.

Digestibility of Oleomargarine.

HOLMES in the *Boston Medical and Surgical Journal* of June 18, 1925, states that twenty digestion experiments were conducted with human subjects to determine the digestibility of typical samples of three grades of oleomargarine containing animal fats.

The three grades of oleomargarine contained different amounts of milk fat which was supplied from butter, cream, or milk.

The coefficients of digestibility obtained for the eleomargarine under consideration were 97.2 per cent, 93.4 per cent, and 96.8 per cent.

The protein and carbohydrate supplied by the diet were as thoroughly digested as in earlier studies of the digestibility of other edible fats in which the same basal ration was used, giving added evidence for the belief that edible fats do not exercise any marked effect upon the digestibility of the other constituents of the diet.

The subjects reported that they experienced no physiological disturbance during any of the test periods with oleomargarine. And since the diet produced no laxative effect, it may be concluded that the limit of tolerance is in excess of 125 grammes, the highest average amount eaten per man per day in any of the series of experiments here reported.

The Newer Methods of Intravenous Therapy in Septicemias of Otitic Origin.

In the *Boston Medical and Surgical Journal* of June 25, 1925, PORTER states that it would seem that the otologists have an advantage over the general surgeon in treating septicemia by being able to eliminate the original source of infection by ligation of the jugular. Moreover, it occurred to him that there was a valuable agent in treating the generally septic cases in which there is no evidence of a definite sinus thrombosis, as in one of his cases.

Since coming to this decision, he has had the opportunity to put mercurochrome to test in a number of cases and has been most gratified with the results.

The full dosage of mercurochrome in man is about 5 mg. per kilo of body weight. In cases with an unusually large number of organisms free in the circulation, he has preferred to give a smaller dose (about 3 mg. per kilo of body weight). He has made the reduction in dosage because he is convinced that the reduction, so much dreaded by those using the drug, is caused not by the mercurochrome but by the liberation of the toxins from the killed bacteria in the circulation. He has repeated the dose and increased or decreased the amount according to the initial reactions which show wide variations.

That there is some danger in the use of mercurochrome intravenously is unquestionably true, especially in cases in which there is kidney involvement. There have been reported some cases in which an acute nephri-

tis has occurred when no previous kidney lesion existed. It is unwise to repeat the injection until this has quieted down. There are on record a few fatalities from complete suppression of urine following a severe reaction. In only one instance has he noted any kidney involvement, a slight trace of albumin, which quickly disappeared.

Ciliary Inhibition or Destruction in Tracheobronchial Asthma—Bronchoscopic Treatment.

In the *American Journal of the Medical Sciences* for June, 1925, MOORE tells us that asthmatic patients referred for diagnostic bronchoscopy and treatment are first given a complete physical examination by the internist. Roentgen-ray studies are then made. As the majority of these cases have come through the asthma clinic, sensitization tests have been completed. No patient is bronchoscoped without having had a physical examination and Roentgen-ray studies.

At the first examination morphine is generally administered hypodermically in doses of from ⅛ to ¼ gr. one hour before bronchoscopy. No general anesthetic has ever been found necessary. In children no cocaine is used, but in adults a 10-per-cent solution is applied deep enough in the pharynx to inhibit the function of the superior laryngeal nerve. This is applied by means of a swab on a curved applicator forceps and repeated once.

There is no contraindication to a bronchoscopic examination during an asthmatic attack in the type of cases herein referred to. Preliminary medical examination has usually eliminated so-called "cardiac asthma" and other conditions in which there is no indication for bronchoscopy.

Bacteriologic specimens are obtained bronchoscopically, uncontaminated by oral secretion, by two means: Either by swab, or, where the secretion is not too viscid and is susceptible of aspiration, it is drawn into specially devised tubes which are inserted between the aspirating bronchoscope and the rubber tube from the suction pump. The tubes are sealed for laboratory examination later. Specimens are immediately "planted" on human blood agar-agar and slide smears made.

With regard to bronchoscopic treatment, two methods are employed to rid the mucous membranes of the trachea or bronchi of their overload of secretion, namely, sponging where the secretion is thick and tenacious, or by aspiration, either through the special aspirating bronchoscope or with a separate aspirating tube inserted through and beyond the bronchoscope. Forceps are ordinarily not required for this. A solution containing ten drops of a 10-per-cent solution of cocaine and 20 drops of adrenalin solution (1 to 1000), in 1 fluidounce of normal saline as a vehicle, is then instilled, using 5 cc in each main stem bronchus. A 10-per-cent solution of silver nitrate has been applied to localized areas in certain cases, and in others guaiacol in 5-per-cent and gomenol in 20-per-cent strength have been used. However, the adrenalin-cocaine combination above mentioned, which is known as the "asthma solution," is the one most frequently employed.

Admission to hospital is not required, and the number and frequency of treatments generally depend, after the first two bronchoscopies, on the character and frequency of the asthmatic attacks, the patient being instructed to report at weekly intervals, so that accurate data may be kept. Some patients require but three or four bronchoscopic treatments, while others have needed as many as eighteen.

One week after the diagnostic bronchoscopy (at which specimens are taken) the autogenous vaccine is ready for administration. This is given at four-day intervals in ascending dosage. This part of the treatment is either carried out by the physician referring the case, or the patient returns to the asthma clinic for its administration.

Practically all cases which have come to them for treatment have shown on roentgenographic study peribronchial thickening to a marked degree in some part of the lung; in some cases general.

Those cases associated with a demonstrable tracheobronchitis have responded best to bronchoscopic treatment.

Ridding the tracheobronchial mucous membrane of secretion will in itself temporarily benefit all cases.

While temporary relief follows these bronchoscopic treatments, permanent relief necessitates intrabronchial medication; the administration of vaccines made from the organism recovered directly from the bronchial secretions; a general attention to hygiene and an abundant diet, the same as for tuberculous patients.

Regeneration of the ciliated epithelium occurs very rapidly after the secretion, which has inhibited its action, has been removed either by aspiration or swabbing.

Impairment of ciliary action has been conclusively demonstrated. Its restoration is imperative for lasting improvement.

The Electrocardiogram and Blood-pressure During Surgical Operation and Convalescence.

In the *Archives of Internal Medicine* for June, 1925, MARVIN and PASTOR state that the blood-pressure was determined and electrocardiograms taken at frequent intervals during anesthesia and operation in thirty patients. Blood-pressures were determined and clinical notes made at regular intervals each day for ten or more days of convalescence.

The blood-pressure during operation varied considerably; it was constantly above and constantly below the preoperative level in an equal number of cases. Changes in pressure in either direction seemed to be without clinical significance except when there was extreme lowering of the systolic and pulse pressures in cases of shock.

The majority of patients in their series failed to show the postoperative fall in systolic and pulse pressures reported by some observers and assumed by many. Of the few patients who did show such a fall, none developed postoperative complications or had a protracted convalescence.

Blood-pressures during the first thirty hours after operation, as well as those taken during the following ten days, were found to be of no value in estimating the likelihood of complications or the rapidity of convalescence.

Electrocardiograms taken during operation showed definite changes, not present in preliminary tracings, in about half the cases. The chief of these were premature beats, paroxysmal tachycardia, and disturbances of the pacemaker. They were not associated with demonstrable changes in the circulation, and seemed to be without clinical significance.

In the same periodical in the same issue, MARVIN, PASTOR and CARMICHAEL state that in this series the blood-pressure was determined, and electrocardiograms taken, at frequent intervals during anesthesia and operation in thirty patients who had been completely digitalized. Blood-pressures were determined and notes of the clinical condition made at regular intervals every day for from eight to eighteen days after operation.

The blood-pressure during operation varied considerably in individual cases. A large proportion (45 per cent) maintained the pressure above the preoperative level, and about one-fourth showed wide fluctuations above and below the preoperative pressure.

A considerable number of the patients showed a fall in the systolic blood-pressure during the thirty hours following operation. An even larger number showed a decrease in the pulse pressure. These changes seemed to have no relation to the clinical course or the development of complications.

The blood-pressure after the second postoperative day was below the preoperative level in more than two-thirds of the patients. Its behavior, during this period, was found to be of no value in estimating the rapidity of convalescence.

Electrocardiograms taken during the operation showed changes not present in preliminary records in about 37 per cent of the patients. The most frequent of these changes were displacement of the pacemaker, reversal of an inverted T-wave in Lead II, and paroxysmal tachycardia. They

were unaccompanied by clinical evidences of circulatory disturbance.

A comparison of the observations on digitalized and non-digitalized patients discloses only few differences. There was a postoperative fall in systolic and blood-pressure in a greater proportion of the digitalized patients than of the non-digitalized. No evidence was secured of a beneficial effect of digitalis on postoperative complications or deaths.

They conclude that there is no convincing evidence that the preoperative administration of digitalis exerts a favorable influence on the blood-pressure or the incidence of postoperative complications in a group of unselected patients. There is suggestive evidence that the drug tends to cause the precise change in blood-pressure which it is usually given to prevent. There is no apparent necessity or justification for its routine employment in patients who possess normal hearts.

A Comparison of Dried, Evaporated, and Fresh Cow's Milk.

In the *British Medical Journal* of June 13, 1925, GLADYS HARTWELL tells us that from the experiments described in her paper on this topic it is obvious that dried and evaporated milks possess quite different dietetic values, and that the dried milk approximates more closely to fresh cow's milk than does the evaporated variety. Although only one sample of each kind of milk was used in this work, experiments previously reported prove that dried milks are superior to the evaporated ones as regards vitamin B content. She sums up as follows:

Dried milk compared with fresh cow's milk:

(*a*) The initial rate of growth of the young rats was more rapid, but the final weight attained was practically the same.

(*b*) The weight of the young on the second day was slightly better—that is, dried milk appears to be a better food for gestation.

(*c*) The suckling rats had thicker and silkier coats if the mothers were fed on the milk diet throughout their lives, but when the milk diet was only fed during lactation (that is, a good mixed diet given during gestation) there was no apparent difference in the sucklings.

Evaporated milk as compared with cow's milk:

(*a*) The rate of growth of the young rats was less rapid and the final weight attained was less.

(*b*) The weight of the young at birth was less satisfactory.

(*c*) The weight of the young at weaning was lower. This applied equally to the baby rats of mothers fed on a good mixed diet during the gestation period, or on the milk diet throughout their lives.

Thus, the dried milk appeared to be quite equal in dietetic value to fresh cow's milk; if there was any advantage, it was in favor of the dried variety.

The evaporated milk, however, compared less favorably with the fresh cow's milk.

It must be remembered, however, that a restricted diet, such as bread and any form of milk, is not as good as a mixed and more varied diet.

Treatment of Cholecystitis.

In discussing a paper by Boardman on this subject in *California and Western Medicine* for June, 1925, ALVAREZ said he was afraid that he is not quite so sanguine as is Boardman about the value of the various forms of medical treatment in cholecystitis. Some of them are based upon theories which it seems to him are unsupported by any definite studies, and the occasional success which we have with them in practice does not teach us much because the disease when untreated varies so markedly in severity from time to time.

Hence it is that he never bothers to put a patient on a cholesterin-poor diet; in the first place, because its efficacy has never been shown; second, because it cannot be proved that the patient has not a gall-bladder full of stones already; third, because so far as we know the presence or absence of stones is largely immaterial—it is the in-

flammation throughout the biliary tract which is the essential thing; fourth, because in order for it to be of any value the patient would have to live on such a diet for years or for the rest of his days; and fifth, because he has no faith in he or she sticking to it. It is only the occasional man or woman who has enough faith, interest and moral backbone to do such a thing year in and year out.

Similarly, he never prescribes cholagogues because he cannot see how they can influence favorably an inflammatory process in the wall of a gall-bladder which is not demonstrably affected in any way by them.

As regards the Lyon technique, Alvarez says it is based on a physiological misconception, and it has been so abundantly demonstrated that the procedure does not drain the gall-bladder that it is hard to see why we should go on using it for that purpose. It may be that temporary increases in the flow from the bile ducts will aid these ducts in throwing off infection, but even then Alvarez would like to have a little proof of the greater efficacy of the tubal over the oral administration of the magnesium sulphate before he spent hours of his time and much of his patients' money with the tube. Theoretically the oral administration ought to work just about as well, and practically he has seen just as brilliant results with it as anything reported by Lyon—if results they were.

The Relation of Dysmenorrhea to Interstitial Thyrotoxicosis.

HERTZLER in the *American Journal of Obstetrics and Gynecology* for June, 1925, tells us, with reference to treatment, that all patients are first subjected to a general examination. If there is an anemia this is looked after as is any other contributing factor. Whether or not the patient comes complaining of goitre, pelvic pains, or dysmenorrhea, the thyroid element is stressed. The patient is assured that this is the important thing and that it is of a type which does not require operation, but is always cured by medication; that the pelvic symptoms are secondary and will disappear as the goitre improves. If they have had a diagnosis of appendicitis elsewhere this is explained as ovarian pain. If the appendix had been removed or the ovaries tampered with, especial care is taken not to leave the impression that the operation was useless, but that happily all the surgery required has been done.

If the patient is very nervous and has lost more than ten pounds in weight she is first given hyoscine (or belladonna) and bromides until the nervousness subsides. Then potassium iodide is added in a grain or two doses one to three times a day. The medicine is given two or three times a day until the weight improves and the pulse becomes 80 or less; then the medicine is continued once a day until the thyroid gland becomes normal.

If after three to six months the dysmenorrhea is not improved, examination is suggested to be made under ether, or sooner if the patient becomes impatient of results. It was his former practice to correct surgically any displacement found, but unless there is evidence of periuterine adhesions this is no longer done. The displacement is a coincident factor and not a cause of the dysmenorrhea. The mythical atresia of the os, the anterior displacements, etc., have, of course, been outgrown years ago. He confesses also to have done resection for "cystic" ovaries, but he is proud to state he has never done an oöphorectomy, thanks to the vehement condemnations of that procedure by his distinguished teacher, Olshausen.

In young patients who are underdeveloped, he believes the use of anterior lobe pituitary gland, five or ten grains a day, aids materially in hastening the recovery.

The theory of the use of the pituitary extract is that this portion of the gland has to do with the development of the genital function. If this be true then the conclusion would be warranted that a hypofunction is the fundamental factor.

Usually from six to eighteen months are required to complete a cure. Often when treatment is discontinued the dysmenor-

rhea returns even without the obvious retarding of the goitre. Sometimes the dysmenorrhea disappears for some months and returns even while the treatment is being continued. Often indiscretions in hygiene or conduct are the cause.

Failure to respond to treatment may be due to anatomic changes in the pelvis; often some hereditary factor is present, or changes in the thyroid gland which do not respond to medical treatment. In the latter case operation may be resorted to. Operation will not cure a condition which was present before the advent of the goitre. As a general thing, operation should be avoided even though the patient does not get well on medical treatment.

That the surgical treatment of dysmenorrhea is wholly unsatisfactory most surgeons know from experience. The abundant literature shows that this experience is universal. This in itself should suggest that the attack is along the wrong front. That dysmenorrhea is commonly relieved by pregnancy was well recognized by the old family doctor. That pregnancy has a far greater effect on the endocrine system than on the anatomy of the pelvic organs is now, in the light of our knowledge of endocrine physiology, perfectly obvious. That the thyroid gland concerns itself with the vicissitudes of the reproductive function likewise is well established. Just what this functional relation is cannot be stated. His clinical experience herein recorded presents another clue to this relationship. It is interesting to note that some of the prescriptions used for dysmenorrhea half a century ago contained postassium iodide. Pure empiricism, however, has given way to at least a semblance of scientific investigation.

He concludes that many young women present small goitres associated with mild degrees of thyrotoxicosis.

Anatomically these glands show changes in the colloid, inactive acinal epithelium and apparently an increase in the cells situated between the acini.

Many of these patients have an associated dysmenorrhea without demonstrable anatomic changes in the pelvic organs.

When these patients are treated in the conventional manner for their goitres, the dysmenorrhea disappears in the vast proportion of cases.

This applies as well to the common groin pains so commonly diagnosed as chronic appendicitis, for the relief of which appendectomy is wholly impotent.

Treatment of Benign Uterine Hemorrhage with Radium.

In the *Illinois Medical Journal* for June, 1925, Scott states that in the treatment of benign uterine hemorrhages radium therapy has its greatest usefulness in women past the age of forty. In younger women small dosages of radium are sometimes used. The use of radium in adolescent bleeding is not as popular as at first; in this type of bleeding radium is confined mostly to the cases that have not responded to glandular therapy.

Radium therapy is contraindicated in the presence of pelvic infection past or present.

Only fibroids smaller than those simulating a three or four months pregnancy should be treated with radium. Large fibroids and those obstructing the cervical canal should be treated surgically.

Clinical and Hematologic Studies on Banti's Disease.

In the *Journal of the American Medical Association* of June 20, 1925, Rosenthal states that Banti's disease is associated with marked disturbance of the number and functions of the blood platelets.

The disease may be divided into two main groups, according to the number of blood platelets present before splenectomy and according to their variations after splenectomy, namely:

(*a*) Thrombocytopenic group. The blood platelets are diminished before splenectomy, followed by a transient rise and then fall to normal or above normal after splenectomy. The thrombocytopenia (or diminution of the blood platelets) is associated with a hemorrhagic tendency. A marked diminu-

tion of the blood platelets may be followed by symptomatic purpura hemorrhagica.

(*b*) Thrombocythemic group. The blood platelets are normal or somewhat subnormal before splenectomy, but rapidly increase to enormous numbers after splenectomy (a million or more) and remain high permanently. This increase in blood platelets is associated with repeated thromboses and consequent hemorrhages.

The results from splenectomy in the thrombocytopenic group are brilliant, comparable to the results obtained in chronic purpura hemorrhagica. Splenectomy in the thrombocythemic group results either in symptomatic improvement or no improvement of the condition.

The Therapeutic Relationship of Digitalis and Strophanthus.

In the *Medical Journal and Record* of July 1, 1925, CORNWALL states it has been long known that digitalis has an almost specific action in the treatment of heart failure associated with auricular fibrillation. In this condition the irregularity of the ventricular action is rectified with resultant great improvement in the circulation. Digitalis brings about this rectification of the heart's action apparently by reducing conductivity at the auriculoventricular bridge so as to block unnecessary and disturbing impulses which come to the ventricles, and perhaps also by breaking up a "circus rhythm." Also, by slowing the conduction time between the auricles and ventricles it favors filling of the left ventricle, which is of special advantage in mitral stenosis. In auricular flutter it may similarly improve the circulation by reducing conduction; it may first change the flutter into fibrillation.

He asks the questions: Has digitalis any value in the treatment of heart failure occurring in conditions other than those associated with auricular fibrillation and flutter? Is the correction of an arrhythmia which functionally impedes the ventricular action its only beneficial effect? Thomas Lewis answers as follows: "The chief value of digitalis lies in its power to control the ventricular rate when fibrillation of the auricles has come.

"A chief cause of the rapid heart action when heart failure threatens or has come is fibrillation of the auricles, and it is in this condition that digitalis acts so beneficially; it reduces and holds the rate within normal bounds. The reduction of accelerated ventricular rate is the only important action of the drug of which we have knowledge. There are few, if any, instances of which we know with certainty in which digitalis acts beneficially except cases of accelerated action; there are few cases of acceleration in which the drug produces unquestionable benefit apart from those provoked by fibrillation of the auricles. . . . Those who regard digitalis as a cardiac tonic mistake its character; its chief action is to slow the heart."

James Mackenzie agreed with Lewis in the following words: "It is to be observed that such a reaction (slowing of the heart produced by digitalis) rarely occurs in conditions other than auricular flutter and fibrillation. . . . As a rule, digitalis has little or no effect on hearts with normal rhythm. So far it seems that the beneficial effects which result from digitalis are not due to any other cause than the mere slowing of the heart rate." [This view is not generally accepted.—ED.]

The therapeutic indications of strophanthus are more extensive than those of digitalis, the limitation of the latter, as laid down above, being accepted. They include all conditions where heart failure is due to or complicated by intrinsic weakness of the heart muscle, that is, by diminished tonicity or contractile energy; and they parallel the digitalis indication to produce therapeutic heart block in auricular fibrillation and flutter. It may be that the power of strophanthus to depress conductivity is generally less than that of digitalis, but it acts better than digitalis in cases of auricular fibrillation with much loss of tonicity of the ventricles, as Vaquez pointed out.

In actual or threatened loss of tonicity from myocardial weakness occurring in the acute infections, strophanthus is indicated.

In pneumonia the author has used and recommended it as the preferred heart stimulant for many years. In these acute infections, when the blood-pressure is usually low, strophanthus has the special advantage of not stimulating the vagus.

In chronic myocardial degeneration with heart failure strophanthus can be used to increase the strength of the cardiac contractions, the dose being graduated according to the needs of the case. When given in place of digitalis for a heart-blocking effect in auricular fibrillation with much loss of tonicity, full doses may be required. In any case of pathological dilatation Cornwall says strophanthus is the most effective drug that we have.

Great care must be taken in giving strophanthus after a strong course of digitalis, as it can precipitate digitalis poisoning; but if given before a course of digitalis it is not likely to prove thus dangerous, being quickly eliminated or destroyed.

The teaching that digitalis is essentially a regulator of the heart's action, that is, of the rhythm and rate of the heart's action, while strophanthus is a direct heart stimulant, that is, a strengthener of myocardial contractions by direct and exclusive action on the heart muscle to increase tonicity and contractility, gives us an explanation of the difference in effect of these drugs which was observed clinically and throws light on their therapeutic relationship.

Surgical and Genito-Urinary Therapeutics

Cranking or Chauffeur's Fracture.

ELIASON *(Journal of the Medical Society of New Jersey,* March, 1925) notes that chauffeur's fracture due to the backfiring of a Ford or a small boat motor while being cranked is usually a fracture of the base of the styloid process of the radius, whereas that due to the backfiring of the motors of larger trucks is likely to be of the Colles type. The difference is probably attributable to the position taken by the driver; in the first class, he usually stands to the side and at a little distance from his crank, while in the second, because of the close bumper, he must stand directly in front of and close to it. The former thus produces its effect by torsion, while the latter acts by "arrachement" or compression, depending upon whether the crank strikes directly against the heel of the hand or against the metacarpals, hyperextending the entire hand.

Fractures at the lower end of the radius are more common in adults, especially those in the "third bone age" of Baetjer, namely, 40 to 60 years. In children, the commonest injury in this region is fracture of both bones above the suprastyloid level, either green-stick or complete; while in adolescence, fracture of the radius alone, 1½ to 2½ inches above the joint, is the usual type. The same facts hold true in backfire fractures.

At the present time the term "chauffeur's fracture" is meant to apply to fracture through the base of the radial styloid, but in view of the fact that subjoined statistics indicate that fracture resulting from the backfire of the crank of a gasoline engine may be sustained at fifteen different situations in the bones of the carpus and forearm, this is too narrow an application of the term. In an analysis of a series of 3785 forearm fractures that have been roentgenographed in the Howard and University of Pennsylvania Hospitals, Eliason notes that over 7 per cent were due to backfire. Of these the so-called Colles headed the list, constituting 27.6 per cent of the total number, while the so-called chauffeur fracture, styloid of the radius, amounted to 25.2 per cent of the number.

As to diagnosis, when a case is seen immediately before swelling obscures the landmarks, diagnosis is relatively easy. Due

consideration should be given to the anatomic points as compared with the uninjured forearm. In the transverse fractures of the Colles type there are the usual symptoms of pain, tenderness, swelling, disability, crepitus, and deformity. The pain is usually rather severe and of a throbbing, aching type. It is not of the stabbing character experienced when muscles are injured by sharp fragments of bone. In examining these cases, a general anesthetic should be used if reduction is to be done. Without an anesthetic, it is cruel to try to demonstrate crepitus and abnormal mobility or to break up an impaction.

The type and position of tenderness are valuable diagnostic aids because, by its proper localization, much information can be gained. Bearing in mind that the joint-line extends in a crescent about half an inch above the styloid, "print pressure" is made with the rubber end of a pencil, a penholder or similar object on the back of the radius, starting above the painful area and gradually passing down toward the wrist. "Point pressure pain" elicited over the radius above the wrist-joint, in the absence of direct trauma, stongly indicates a fracture. Should the point pressure develop pain and tenderness over the joint-line only, there is probably no fracture above, and the diagnosis of sprain or synovitis of the wrist should then be made.

Deformity is usually marked. The radial styloid is driven up the forearm, making the interstyloid line transverse, or, in extreme cases, oblique, in the reverse direction. There is usually radial deviation of the hand, and the thenar eminence is on a level with or above the hypothenar eminence. The anterior skin lines are inclined upward on the radial side, whereas normally they incline slightly downward. The wrist is held in slight flexion. There is usually the "silver fork" deformity due to displacement of the lower fragment upward, backward and to the radial side, causing a decided hump above the wrist.

Given a young patient, with the history of a backfire injury, one looks for an epiphyseal separation of the lower radial extremity; if under 17 years of age, an incomplete fracture, 1½ to 2 inches above the styloid. Sprain and dislocation are extremely rare in adolescence. In young adults, with a history of compression or hyperextension, the injury is probably a Colles fracture. Styloid fracture of the radius should be suspected. Scaphoid fractures which have no deformity show painful wrist motion, limited adduction, tenderness in the "snuff-box," and point pressure tenderness or pain over the scaphoid, associated with joint swelling on the radial side.

Impacted fractures in good position should not be disturbed. Impacted fractures in only fair position, if comminuted and in the aged, should not be disturbed. Most frequently the fracture can be reduced simply by forcibly flexing and at the same time carrying the hand to the ulnar side, using the ulna as a pivot fulcrum. A block of wood, as a fulcrum over which to bend the fracture, is useful. Forcible traction in the line of the radius is seldom needed as there is no real shortening, there being merely a crushing upward and backward. The reduction is usually a very simple procedure, but the maintenance of proper apposition is difficult when there is either comminution or much crushing of the posterior cortical bone. Should difficulty be encountered in reposition of the parts, traction is made with the hand-shake grasp, then acute flexion and rotation, with the thumb of the other hand pressing downward and forward against the lower fragment, while the fingers of the grasping hand push backward upon the upper fragment.

The bearing of early and complete reduction upon deformity and function is shown statistically by Hitzrot and Murray. Their figures indicate that complete reduction within six hours results in practically complete restoration of function, while a delay of twelve to twenty-four hours materially impairs the final functional and anatomic result. Incomplete reductions are invariably responsible for moderate or

marked deformity and greatly impaired usefulness of the part, as well as a painful wrist.

Many writers advocate removal of splints in two to three weeks, but this is a little too radical and may occasionally result in disaster. The splints are not the cause of subsequent deformity and stiffness; these complications are caused by failure to obtain perfect reduction or, later, neglect ot massage and motion. Function is what is wanted first and anatomic perfection second.

Under proper care the prognosis of basal fractures of the radius is excellent, provided arthritic changes are not present or do not appear. Non-union is unknown.

The Relative Merits of the Various Treatments of Peptic Ulcer.

BALFOUR *(Minnesota Medicine,* Vol. VIII, No. 4) in a recent review of 1000 cases of chronic duodenal ulcer in which gastroenterostomy had been performed ten years before, reports that 88 per cent of the patients had experienced satisfactory relief from their ulcer symptoms.

Balfour observes that the operator is safe, the mortality rate being between 1 and 2 per cent; it is usually simple, and it can often be done when any other procedure is definitely contraindicated. These facts explain its wide application. Of 6665 cases of chronic duodenal ulcer coming to operation in the Mayo Clinic, gastroenterostomy has been performed in 5755 (86.35 per cent).

To attain the best results from gastroenterostomy, a safe principle to follow is that the more extensive the lesion, the more definitely is the operation indicated, and the more certain are its results. Consequently, it is in cases of long standing that the operation is most effective, particularly when potential or actual obstruction exists. The advisability of removal of the ulcer at the time of gastroenterostomy must be determined in each case, but the necessity for it is comparatively infrequent. In the Mayo Clinic, excision of the duodenal ulcer has been done in addition to gastroenterostomy in only 2.18 per cent of the cases.

Operations at the outlet of the stomach, either those embodying a reconstruction of the pylorus or a gastroduodenostomy without division of the pylorus, have a definite though limited place in the treatment of chronic duodenal ulcer. Many methods have been devised for carrying out these operations, but it is significant that none has attained wide-spread use. The results of such operations in the Mayo Clinic have not been so satisfactory as the results of gastroenterostomy, and they have been performed in selected cases, chiefly when gastroenterostomy, because of techincal obstacles, was inadvisable. Under such circumstances a large pyloroplasty is a useful substitute for gastroenterostomy. The chief merit of pyloroplasty is that it permits inspection of the mucosa of the duodenum and pyloric end of the stomach. A knowledge that multiple ulcers are present is of value, both from the standpoint of operative procedure and of interpreting disappointments after operation, particularly the recurrence of hemorrhage. The advantage of excision of a duodenal ulcer, which is usually possible with pyloroplasty, is a doubtful one, and, in other than exceptional cases such as the bleeding type of ulcer, is not necessary. The chief disadvantage of operations at the outlet of the stomach is that they do not have an assured positive effect in reducing the acidity of the gastric juices, or in maintaining that reduction, and since the value of any operation on the stomach is largely determined by its effectiveness in this respect, such a disadvantage is serious.

The most interesting recent development in gastric surgery has been the advocacy of partial gastrectomy for duodenal ulcer. There seems little reason to believe that this operation will attain much popularity since it necessitates the removal of a large part of the normal stomach to relieve a benign condition of the duodenum which can be satisfactorily dealt with by a simple indirect operation in all but a small percentage of cases. The argument that partial gastrectomy obviates the possibility of subsequent ulceration is not absolutely sound, since secondary ulceration may and does

occur after partial gastrectomy. Moreover, since the recurrence of ulceration after gastroenterostomy is only 2 per cent, a routine partial gastrectomy is hardly justifiable to prevent such a slight liability.. It seems more reasonable to reserve partial gastrectomy for the exceptional cases of duodenal ulcer in which secondary ulceration does occur. Partial gastrectomy may, however, be amply justified in gastric ulcer.

Advance in Surgery From Physicochemic Studies of the Blood.

WILLIAM J. MAYO *(Illinois Medical Journal,* March, 1925) notes that if the body be deprived of oxygen, death occurs in from seven to ten minutes. Since 47 per cent of the earth, air, and water is composed of oxygen, it is surprising that there is no storage facility in the body, either for oxygen or for substances which, under stress, would produce it. Until recently it was believed that the red cells were completely renewed every seven days, but it is now known, through the work of Ashby of the Mayo Foundation, that these cells may live for many weeks. The red cells function, but they have no nucleus and, therefore, have no power of growth. Blood transfusion clearly demonstrates the value of the introduction of oxygen carriers as a temporary aid to the rehabilitation of an anemic patient.

Quantitative and qualitative methods of study, based on cell morphology, give extraordinary knowledge of the power of defense of the white cell in the infections, and the decision to operate in an acute condition may finally rest on a rising white cell count. Without the white cell there would be no repair of injuries. On the other hand, the diagnosis of leukemia, in the acute form, may depend on the changed morphology of the white cells, instead of on a high leucocyte count, as in the chronic forms.

The relation of the blood platelets, which are derived from the megakaryocytes of the bone-marrow, to blood clotting and the purpuras, has become evident, as well as the agency of the spleen in the prolonged destruction of blood platelets, which may cause a drop from a normal count of from 225,000 to 300,000 or more, to 40,000 or less, causing chronic purpura in which splenectomy has given striking curative results.

We begin to look on the spleen in a new light, as a coarse filter of the cellular elements which have outlived their usefulness, and as a limited source of white cells. The spleen is a destroyer of worn-out red cells, and if it is enlarged, it may, by an unnecessary destructive activity, bring about anemia. In cases of pernicious anemia, the spleen perhaps functions normally as an executioner of red cells of reduced value, which, however, are capable of maintaining life, and are the best the bone-marrow can produce.

It is in the atomic and molecular field that oxidation takes place and the constitution of the molecule is altered. Crystalloids, of which glucose is a good example, lie in the molecular field, as do the amino-acids, which are the final results of protein metabolism. These ultimate products are formed in the liver, for, as Mann has shown by animal experimentation, if the liver is removed, sugar and urea in great part disappear from the blood.

To-day, precise examinations of the blood, for reactions which concern the colloids and molecular and atomic substances, have been raised to the dignity of sound methods of securing information of vital phenomena.

The function of the kidney may be briefly defined as the filtration of non-colloid constituents of the blood plasma through the capsule, and the resorption of threshold bodies in solution through the tubule cells. The kidney is, therefore, chiefly a filter whose function is to eliminate certain metabolites, such as urea, chlorides, and creatin, from the blood. Urea is listed by Cushny as a non-threshold body; it is one

of the smallest of molecules, and is not hydrated; that is, it does not change in size by absorbing water. The urea molecule must be roughly about the size of the molecule of the dye, phenolsulphonephthalein, which Rowntree has shown by intravenous injections would be eliminated from the blood through the kidneys about as readily as urea would be eliminated. The Rowntree and Geraghty phenolsulphonephthalein test is an accurate guide to the functional capacity of the kidney to eliminate urea. Retention of chlorides in the body, through disturbance of renal function, results in the edemas. Creatinin is another waste material, derived from the tissue catabolism excreted by the kidneys. Estimation of these substances in the blood affords the most reliable prognostic index to renal function.

Through studies of the blood has come the remarkable improvement in the results of operations on patients with reduced renal function. Such improvement could not be estimated by the old method of examining the urine. When the blood urea rises above 125, operation becomes most serious, unless it concerns obstruction to elimination by the kidneys. Even when the blood urea is above 300, the well-prepared patient may recover from operation, provided the urinary obstruction can be relieved, as in certain conditions of the prostate. When the blood creatinin rises above 5, a serious barrier to excretion is present, and the patient is in danger; when it rises above 10, the patient will probably die unless the barrier is removed.

If the renal function, in relation to elimination of urea, chlorides, and creatinin, is so reduced that the urine cannot concentrate normally, a large intake of water is necessary. If the renal incompetency is due to the stage of cardiac insufficiency, the patient may not bear the amount of water necessary for elimination, and a secondary edema may develop. Measures must be taken to obviate this cardiorenal complication. Under intelligent management, the condition of a patient with most serious toxemia from renal insufficiency may be improved, and a successful operation performed.

Rehabilitation of the blood in cases of renal incompetency consists in giving fluid in the form of sodium chloride and glucose solution rectally, subcutaneously, or, if the condition is acute, intravenously. Glucose maintains heat and energy in the body and reduces the metabolites in the blood by preventing destruction of tissue. If the blood chlorides are high, water without sodium chloride is indicated, but as a rule they are low and large quantities of hypertonic sodium chloride solution are given intravenously.

In high intestinal obstruction the chlorides of the blood go down while the urea and creatinin go up. The problem is to restore the body fluids with water, which also aids elimination of urea. To restore the chlorides, chloride of sodium is given, not bicarbonate of soda, in the water, since alkalosis exists. Glucose is added to maintain oxidation in the body for heat and energy, and to check destruction of body tissue. This treatment will reduce the toxemia.

Owing to precise methods of estimating blood sugar, we are to-day able to operate on the diabetic patient, properly rehabilitated, for general surgical conditions, with a mortality not exceeding that of the average, as shown by Wilder.

The surgical mortality in cases of jaundice in which patients have been properly prepared has been reduced from above 10 per cent to less than 3 per cent, as shown by Walters.

Last, but by no means least, by the use of the Rowntree-Rosenthal test with the intravenous injection of the dye, tetrachlorphthalein, we are able to accurately gauge the functional capacity of the liver, thereby avoiding many deaths from toxemia due to failure of hepatic function. Such deaths previously were charged to the lungs, the kidneys, the brain, and the heart, when, as a matter of fact, these organs were not the cause of death, but merely the executioners.

Surgery in Hypertrophic Pyloric Stenosis.

ZIEROLD *(Minnesota Medicine,* June, 1925) quotes Hertz to the effect that this condition was found in 2.7 per cent in a series of 2275 infants under one year of age.

The essential lesion is a hypertrophy and hyperplasia of the musculature of the pylorus, chiefly in its circular fibers. The pylorus appears grossly as a firm, spool-like mass almost cartilaginous in consistency and sharply demarcated from the stomach and duodenum. The mid-portion is white and almost avascular, but at the gastric and duodenal margins the circulation rapidly approaches the normal.

On axial section the pyloric mass is dense and uniform. The circular muscle fibers are increased in number and size, and friable, as though undergoing some hyaline change.

The mucosa apparently persists at its normal growth rate and aligns itself in longitudinal folds which further obstruct the already constricted lumen. According to Strauss the degree of obstruction has little relation to the size of the tumor mass, which he finds to be smaller in young infants than in those of eleven or twelve weeks.

Directly following birth there is a free interval which gives no intimation of forthcoming events. When obstruction becomes established in an otherwise normal infant, vomiting commences and soon increases in severity and frequency, being usually explosive and projectile in character. Unlike the vomiting of toxic states, the desire for food is generally present and the attempts of the stomach to empty normally are soon manifested by marked peristaltic waves. Appearing a few days after vomiting is begun, these gastric waves may be taken as corroborative evidence of obstruction and have been experimentally demonstrated, but their size and severity are not at all proportionate to the degree of pyloric hypertrophy.

It is probable that complete closure of the lumen rarely if ever obtains and that some portion of the feedings passes onward into the intestine, the resulting stool being more scanty than normal. This finding of persistently small bile-stained mucous stools is of the greatest significance, as it at once gives information as to the location and the severity of the lesion. Further evidence may be gained by noting the time at which ingested food is vomited, by measurement of the aspirated content, and by fluoroscopic examination.

As little of either fluid or solids is allowed to pass to where it may be absorbed, and as water absorption from the stomach itself is negligible, dehydration phenomena soon appear which, if allowed to continue unrelieved, result in appalling weight loss.

Continued vomiting, accompanied by visible gastric peristalsis and starvation stools, implies failure of the stomach to empty, and if not promptly and effectively relieved by other means, is an indication for surgery.

The amount of time which may be safely expended in observation or dietary treatment is variously estimated. Most clinicians are governed by the increase or decrease in body weight. Although recovery has been reported following operation after 40 per cent weight loss, any approach to the fatal Quest figure of 30 per cent makes the outcome extremely doubtful. Inspection of the normal infant weight curve makes it plain that a stationary weight is, in effect, a losing weight, and as compared to the adult a persistent weight loss really proceeds by geometrical progression.

Because of the especial susceptibility of infants to dehydration, restoration of tissue fluid and blood volume is the first consideration of preoperative treatment. In the milder cases, water by bowel, or subcutaneously, is sufficient if employed early and freely. In the severe and prolonged states of anhydremia, transfusion (via fontanelle) is necessary to replace the destroyed cells and serum protein. It is probable that routine preoperative transfusion is advisable in all, and necessary in most cases.

The use of sodium bicarbonate is un-

necessary in the lesser degrees of anhydremia, and is contraindicated in the advanced stages because of its effect on further concentrating the blood and because of the algalosis which usually occurs as a normal water balance is established. For the same reasons the acidosis resulting from fluid loss is better overcome with glucose; this may be administered in 5- or 10-percent solution not to exceed the limit placed by Woodyatt at 1 gm. per kilo per hour.

Gastroenterostomy, the operation of choice up to 1911, has been definitely discarded as unphysiological and dangerous. To-day the generally accepted procedure is that of Rammstedt, either in its original form or as modified by Strauss.

The most direct route to the pyloric lesion lies through the right rectus muscle just above the liver margin. The site is advantageous not alone because it insures a direct approach, but also because the liver prevents the escape of intestine while opening and closing the abdomen and acts as a buffer for the closed wound. To combat this and also to shorten the time expended in closing, the incision should be as small as compatible with easy delivery of the pylorus. This length will usually not exceed 5 cm.

Once through the peritoneum the pylorus may be located with the tip of the exploring forefinger and brought to the surface with a narrow curved retractor which is slipped alongside the finger. If delivery be found difficult because of short mesenteric attachments it may be aided by gentle traction on the falciform ligament.

With the pylorus barely delivered and resting in the curve of the retractor, the pyloric tumor is incised longitudinally from stomach to duodenum, the deepest part of the incision being at the midportion and extending only part way to the mucosa. With a flat-bladed instrument the edges are separated and the deeper fibers are ruptured, allowing the exposed mucosa to bulge into the opening. Frequently some fibers remain intact and require cutting. This is particularly true near the duodenal end.

As an incomplete operation is fatal to success in most cases, the incision of the muscle should be carefully inspected for constricting bands, and when all such have been divided the mucosa should bulge freely into the wound throughout its length. The patency of the pylorus is usually made manifest by the gurgling escape of gas from the stomach into the intestine.

In some few cases there may be marked and annoying hemorrhage, particularly in those in which the tumor mass is not large or sharply defined. As it is chiefly venous and as no large vessels are to be encountered, hemostasis can usually be effected by a warm moist sponge; if not, a tag of omentum may be stitched to the serosa. Any attempt at placing deep sutures to control bleeding is useless, as the tissue is too friable to retain them.

A not uncommon operative accident is perforation of the duodenal mucosa. The reason for this is usually an ill-advised attempt at cutting the deep muscular fibers which surround the pyloric orifice. While the operative risk is obviously increased not only by the possibility of leakage, but by the added time necessary to repair the damage, this complication is not often a cause of death. Simple approximation of the mucosal wound and application of a covering of omentum is usually successful.

In closing the abdominal wound it is well to remember that the infant places a much greater strain upon the line of suture than does the adult and the incidence of ruptured wounds is correspondingly increased. This may be guarded against by using chromic gut throughout and by generous reënforcement with silkworm stay sutures.

The infant must be returned to his normal diet in the shortest possible space of time. The prolonged practice of abnormally timed and modified dietaries is not only of no possible good but a source of actual damage to the patient.

What is frequently overlooked in infant surgery is loss of the usual periods of rest. This is probably due to the natural hesitancy in administering opiates to the very young. It has recently been demonstrated that

babies tolerate opium best in the form of codeine, and that double and treble the usual doses may be administered with safety.

Veeder, Clopton and Mills, who made roentgenologic observation of children years after recovery, found gastric motility to be normal, and Reiche reported a series of forty-seven cases above average weight and enjoying excellent health, eight years after operation.

Management of Antenatal Syphilis.

FRASER and IMPEY *(American Journal of Syphilis,* April, 1925) quote McDonagh to the effect that a woman who has once given birth to a syphilitic infant may infect, in utero, all her subsequent offspring, although the father of the latter may be a different husband, who has never suffered from the disease. The statement is made that congenital syphilis is more serious than the disease acquired after birth and that its postnatal treatment is less satisfactory. The admission of the direct infection by semen is accepted as occurring at fertilization or after the fertilized ovum has reached the uterus, the woman being infected before or as a reseult of this infection. The manifestations of syphilis in a woman bearing a child are mild.

The Wassermann readings, which may have been continuously negative, may become markedly positive after the menopause. Moreover, many women show their first manifestation of syphilis after the menopause. The Wassermann reaction is regarded as simply an accessory aid to diagnosis. Its rationale is not understood. There are many syphilitic sera which do not react positively to the Wassermann test. The serological diagnosis is open to a greater error than is the clinical diagnosis.

Boero found only 106 positive readings out of 229 syphilitic pregnant women; 10 others showed some slight retardation of hemolysis. If the Wassermann reaction during pregnancy is negative in frankly syphilitic cases, innumerable latent cases must be missed.

The Wassermann reading of the syphilitic infant is no more satisfactory. A syphilitic infant may give a completely negative reading at birth and for many months afterward. It is further stated that even a positive reaction in a pregnant woman is of no great value, for many women, especially those who are toxic, exhibit a lipoidal blood content sufficient to unbalance the test.

As to treatment, arsenical and mercurial therapy is indicated from the moment pregnancy is discovered, or syphilis diagnosed or suspected. If infection occurs after conception, specific therapy is conducted with possibly greater vigor. Mercury is given by inunction, and arsenobenzene intraveneously in small doses. The particular arsenical preparation is immaterial. Arsenic will not affect the fetus, but may interfere with the course of pregnancy. The authors administer as much as 0.15 gramme of neosalvarsan or 0.05 silver-salvarsan by the intravenous route daily for twelve consecutive days per month. Where intravenous administration is impossible, sulfarsenol in daily doses of 0.06 gramme given intramuscularly is the alternative of choice.

As to the results of treatment, the risk of transmitting syphilis to the fetus can be practically eliminated by scientific antisyphilitic treatment of the mother during her pregnancy. Neither the age of infection should affect the question of treatment during pregnancy, nor the fact of a negative Wassermann reaction.

Boeck's case is cited in which thirty-seven years after her infection a woman gave birth to a syphilitic infant. A suggestive type of case history is as follows: first pregnancy, no treatment, infant syphilitic; second pregnancy, treated, infant healthy; third pregnancy, after no treatment for eighteen months, infant syphilitic; fourth pregnancy, treated, infant healthy.

The mother's reaction being healthy at the end of pregnancy the infant is less likely to be syphilitic. Out of 274 infants born of

mothers positive at end of pregnancy, 267 were syphilitic; while out of 104 born of mothers who were negative but syphilitic, 24 were syphilitic.

Every prospective mother should receive a routine Wassermann examination. Where such a serologic reading should prove negative in the face of definite clinical suspicions, the clinical evidence should be given definite preference, and the woman the benefit of treatment throughout her pregnancy.

The problem of antenatal syphilis thus resolves itself into an unalterable dogma that every syphilitic expectant mother must be given the advantage of preventive treatment in view of the possible death or infection of her child in utero.

Splanchnic Analgesia.

HILLMAN *(Proceedings of the Royal Society of Medicine,* Vol. XVIII, No. 5, 1925) quotes Pannett's experiments, which demonstrated that novocaine placed in relation to the mesenteries of the viscera definitely protects the animal from shock caused by handling those viscera. He also showed that the rigidity of the abdominal wall in operations on the abdomen was considerably reduced when the mesenteries of the viscera operated upon were infiltrated with novocaine. Hillman uses a one-per-cent novocaine solution. The syringe is of the Record type, graduated at 10 cc. The extra 2 cc of the syringe is left ungraduated for aspiration purposes. This syringe is fitted with handles, and there is a ring on the plunger to allow of easy manipulation. The nozzle carries a pin which fits the bayonet catch of the needle. The needle for splanchnic analgesia is 12 cm. long, 1 mm. in diameter, and is made of rustless steel. For the field block needles 8 cm. long are used.

After the patient has been anesthetized he is turned on to his left side and a small pillow or sand-bag is placed under the lumbar spine between the last rib and the iliac crest. This prevents sagging of the spine and tends to open up the costovertebral angle. The knees are drawn up and the first lumbar spine is identified by counting upward from the fourth spine, which is found immediately above or on a line joining the two iliac crests. At a point four finger-breadths external to the first lumbar spine the splanchnic needle is entered and is advanced at an angle of about 45 degrees to the median plane, forward, inward, and slightly upward until the body of the first lumbar vertebra is struck, the depth of this usually being 9 cm. or three-quarters of the needle. The needle is next withdrawn until its direction can be changed, when it is again advanced, but inclined slightly more forward and the vertebral body again struck. If the direction of the needle is now correct it will be felt to slip over the edge of the vertebra; if this is so the needle is then advanced 1 cm. further and there stopped. If the bony contact is not made when the needle has entered to a depth of 9 cm. it should not be pushed across it will not be in the right place, but it must be withdrawn and directed a little less forward. It is then advanced again until contact with the bone is made at the right depth and the procedure finished as before.

Aspiration is performed, to make certain that the needle is not in a blood-vessel, and 25 to 30 cc of novocaine solution are slowly injected. The other side is treated in the same way.

With regard to the technique of the abdominal field block. All the nerves except the seventh dorsal turn downward on entering the rectus sheath; hence the novocaine has to be deposited along the outer border of the rectus sheath.

Apperly points out that these injections cause a fall of blood-pressure and post-operative headache and backache. Also they take time. He notes the absence of post-operative pulmonary complications, quiet respiration, perfect relaxation and small amount of general anesthetic needed as advantages.

Hewer made a series of experimental injections of methylene blue in the post-mor-

tem room. The results showed clearly that the solution traveled for a considerable distance in the retroperitoneal tissues, and did actually surround the sympathetic plexuses. He then began injections upon the living subject, and had, up to date, anesthetized eleven cases of major abdominal surgery by the technique described. Hewer considers that shock in high abdominal operations is definitely diminished by splanchnic analgesia, and notes that in the series of cases recorded by him the average pulse-rate at the end of operation was 91 compared with 120 in a similar series operated upon under general anesthesia.

Cade from an experience of fifty cases of splanchnic analgesia, in upper abdominal operations, had ten failures, these patients requiring a general anesthetic in addition. The value of the method was shown by diminished mortality after gastrectomy, increased postoperative comfort, and absence of pulmonary complications.

Experimental evidence of the beneficial effect of splanchnic anesthesia is shown by comparing blood-pressure tracings of cats and rabbits on which various surgical procedures had been carried out with and without splanchnic anesthesia. From these it is seen that afferent painful impulses from the viscera produce marked disturbances of the blood-pressure, pulse, and respiration, and that these variations are eliminated by blocking the splanchnic nerves and semilunar ganglia.

Novocaine, even in dilute solutions, is not entirely devoid of danger. Some patients show an idiosyncrasy to the drug manifested by tachycardia, cyanosis of the fingers and lips, and respiratory failure. Intravenous injection of novocaine is extremely dangerous as it produces apnea; this had been repeatedly proved by experiments on animals. Combined with paravertebral anesthesia, splanchnic analgesia would seem to be the method *par excellence* for nephrectomies and other operations, as it does not throw any additional strain on the opposite kidney. Secretion of urine is not affected by injections of novocaine.

Mortality in Appendicitis.

Willis *(Virginia Medical Monthly,* April, 1925) quotes the vital statistics for the Registration Area of the United States in the five years period 1901-1905 to the effect that the mortality rate for appendicitis was 11 to 100,000 population. In the next quinquennial period it increased slightly, being 11.2 per hundred thousand. From 1916 to 1919 it had risen to 12.4; in 1920, to 13.4; and in 1921, to the amazing figure of 14.4 per hundred thousand population.

Putting the population of the United States at 110,000,000, by the methods of treatment employed in 1901, 12,000 persons would have succumbed to appendicitis; by our "modern" or "improved" method, the number is actually almost 16,000; indicating that the "improvement" has resulted in the annual sacrifice of almost 4000 lives.

Nor is this the only evidence that there is something radically wrong with present-day methods of treatment of appendicitis. In a series of patients observed during the years 1901-1905 inclusive and treated conservatively, Ochsner reported a mortality rate of 4.1 per cent from appendicitis. A prominent Virginia surgeon recently stated that the mortality in appendicitis was 10 per cent; and, last year, Gatch reported a series of cases treated by modern methods with a mortality of 8.7 per cent.

It is appalling to realize that the annual deaths from appendicitis equal all from salpingitis, pelvic abscess, surgical diseases of the pancreas, spleen, thyroid, gall-stones, and ectopic pregnancy. The annual toll taken by appendicitis almost equals the combined total of intestinal obstruction, gall-stones, and gastric and duodenal ulcer. Impressive as is the actual number of deaths from appendicitis, the figure gains significance when it is recognized that this number is taken from the most valuable of our population.

Cancer takes its toll from the aged. Appendicitis affects chiefly those in the productive period of life.

The cancer death-rate is six times that of appendicitis. Approximately 20 per cent of the cancer deaths occur before the age

of 50; 80 per cent of the appendix deaths occur before the age of 50; up to the age of 45 there are a few more actual deaths from appendicitis than there are from cancer. The increase has been about 1½ per cent per year during the past twenty years. It behooves the medical profession to become aroused to the gravity of this situation a little in advance of the legislators of this country.

In commenting on this paper McGuire states that he has recently had a demonstration of how little some of the best of our recent medical graduates know about appendicitis. He added a new assistant to his staff, one who after graduation had spent a year in a hospital noted for its meticulous care in the complete laboratory study of its patients. During the first week of this man's interne service four or five acute cases of appendicitis came in. The cases were so plain that the nurses would be making the preparation for immediate operation while the interne was getting an elaborate history and ordering numerous laboratory examinations. He would follow these cases to the operating-room in a somewhat critical spirit, because of what he considered failure to make a proper preliminary study. After he saw half a dozen suppurating or gangrenous appendices removed, he frankly admitted he did not know anything about appendicitis.

Rawls alludes to the time element between the beginning of the attack and surgical operation and to the bearing this has on mortality. He states that he usually asks his patients if they had pain. They call it "indigestion," and they say "Yes." "Where did it begin?" "In my stomach." "What part?" "Upper part." "When did it start?" "Yesterday, or last night." "Where is it to-day?" "On my right side." Rawls stated that he hasn't run across anything that will give a history of such a pain other than an attack of acute appendicitis.

Willis, in closing the discussion, said: "We will never be able to lower the mortality in certain acute abdominal conditions without first reaching the great body of the profession and through them the public. Much of the mortality in acute abdominal conditions is due to home medication, principally cathartics, and this can never be controlled until there is a thorough appreciation on the part of the mother and other members of the family that cathartics are absolutely contraindicated in the presence of abdominal pain; and, further, that no life was ever saved because of a purgative in the presence of pain, but on the contrary many lives have been lost through its administration."

The Artificial Induction of Leucocytosis.

FERGUSON and THOMAS *(Lancet,* June 20, 1925) report extraordinarily good results in a variety of diseases incident to the production of increased leucocytosis by means of drugs, and note that it is a matter of common knowledge that a man in the best condition has a high white cell count, and can stand exposure best to infections. When harmful infecting organisms do find lodgment, there is, in most infections, an immediate rise in the white cell count, these cells being directly involved in resistance.

The cases that appeared to be greatly benefited are those of encephalitis lethargica, arthritis, asthma, bronchiectasis, pyelitis, acute otitis media, eczema, iritis, iridocyclitis, carbuncle, and hay-fever, and these after one to three injections each.

The case of a man is reported who suffered from his fourteenth recurrence of hay-fever, with the conjunctivitis, congested nasal membrane, cough, sneezing and ordinary discomfort of the infection. An injection of salicylate of mercury was given and twenty-four hours later he was perfectly well. The affection in this case returned in six days. A second injection of salicylate was not so potent. On the third day of recurrence novarsenobillon was given, resulting in the best year this patient had in fourteen years.

Thomas has made a laboratory study which shows that both novarsenobillon and quinine markedly increase the number of the white blood cells. It has been shown that tolerance to mercury is somewhat rap-

idly established, the leucocyte count returning to normal and being apparently but little influenced by repeated injections.

As to the dosage, Ferguson has given on an average four injections, each of one grain of the salicylate of mercury in oily suspension. Arsenobillon was given in doses from 0.3 to 0.6 gm. Thomas remarks that it seems reasonable to believe that in novarsenobillon we have an agent practically painless in administration and at least as safe as either of the others in suitably selected cases. Its first effect upon the leucocyte count is at least as marked, its period of maintained leucocyte increase much longer, and its effect at repeated injections very much greater and more constant than in the case of the mercury and the quinine. There seems to be very little doubt that in novarsenobillon and its variants we have a very constant and dependable agent for inducing leucocytosis, where this is desirable.

It seems but reasonable to believe that however successful one may be in inducing leucocytosis, the army of phagocytes will be ineffective if unattended by munitions of war, the multifarious "antibodies," and it is now proposed to observe the effect of the administration of novarsenobillon to patients whose specific antibody formation has been stimulated by autogenous vaccines. It appears to be a more sound rationale to bend to one's purpose not the cellular alone but also the humoral factors of immunity.

Dangers of Frequent Vaginal Examination During Labor.

SAVAGE *(Virginia Medical Monthly,* April, 1925) quotes statistics from large maternities to the effect that puerperal sepsis increases in proportion to the number of vaginal examinations made during labor; this in clinics conducted under most ideal and aseptic conditions. The danger is obviously greater in cases conducted at the home of the patient. Polak and Beck in a study of 200 cases coming to Cæsarean section have shown the effect of vaginal examination upon morbidity rate. The morbidity rate for cases upon which rectal and abdominal examination alone had been made was 28.8 per cent compared to 52 per cent in the cases which had been examined per vaginam. They also showed that the morbidity rate was reduced approximately half in cases which were examined in the hospital alone, compared to those examined outside of the hospital and previous to admission. Their statistics demonstrated that early rupture of the membranes and hours of labor were factors which increased the morbidity rate, together with the greater factor of too frequently and carelessly conducted vaginal examinations. The mortality rate in the same series of cases was 3.3 per cent in the clean cases and 14.6 per cent in the potentially and frankly infected cases.

Polak has quoted a record of 5000 consecutive confinements which were attended by senior students in the out-patient department of the Long Island Hospital, of Brooklyn, in which there were no deaths from puerperal infection. No vaginal examinations were made and the progress of labor was watched by abdominal and rectal examinations. These statistics are significant of the fact that some of the danger of puerperal infection from too frequent and careless examination can be eliminated, and that vaginal examination is not a matter of routine necessity. If students are able to conduct a series of cases with only rectal and abdominal examination by which to judge the progress of labor, and can obtain this result, the average physician should in a like manner strive to equal their enviable record.

Prenatal examinations are desirable and important because a diagnosis can be made in some cases in which we can predict a slight prolongation of the labor because of various conditions, such as funnel pelvis, contracted pelvis, abnormal positions, twins, fibroid uterus. These cases can be watched with a careful expectancy without the necessity of making frequent examinations in order to determine the cause for the arrest of labor.

Approximately 25 per cent of all dry

labors are prolonged, particularly the primiparous, and frequent examinations in dry labors are the more to be avoided because both premature rupture of the membranes and hours of labor are predisposing factors to the incidence of puerperal infection.

There are many men who have become very proficient in the use of rectal and abdominal examination, and these men found out from experience that the percentage of correct diagnoses increased steadily with the use of this method. Lankford states two basic reasons for rectal instead of vaginal examinations: "It is safer for the patient," and "it is more convenient and time-saving for the attendant."

The Insect Menace.

Under this title MACKIE publishes in the *Indian Medical Gazette* for April, 1925 (quoted in the *Military Surgeon,* July, 1925), his presidential address to the Medical Section of the Indian Science Congress of Benares in January, 1925. He notes the number of people killed in India by snakes, tigers and panthers is as nothing compared to the number who perish because of insects. Malaria, plague, relapsing fever, guinea-worm disease, filariasis, dengue and sand-fly fevers, and almost certainly kala-azar, are referable entirely to insects. Cholera, enteric fevers, the dysenteries and infantile diarrhea are among those carried by these agents.

In the years 1921-'22 no less than eight and a half million persons died from insect bites in British India alone.

In the first six months of 1924, 200,000 persons died of plague in the Punjab. In addition to deaths there are many millions who make a partial recovery and suffer from permanent ill health. Bentley has stated that in the whole of British India there are 100,000,000 cases of malarial fever each year.

As to the antiquity of insects Mackie traces them back a hundred million years.

There are several classes of disease-carrying insects. First, those which are specific to man and which spend the whole of their life history on his body. Such are the mites and the lice, and these from their habits should be capable of easy extermination. Secondly, those like mosquitoes, tsetse flies, ticks, and fleas, which are carriers of specific parasites, and though living in part a saprophytic existence probably require blood for their full sexual development. Thirdly, those which are casual or occasional parasites, such as fleas and even rat fleas, which for man are only incidental or accidental disease carriers.

In human malaria there are endemic centers of low toxicity—low, that is, to the local population. This condition exists in parts of Central Africa and of India. In these communities the children all become infected and take malaria as an infantile disease, whilst the adults are all carriers and themselves show no sign of disease. The arrival of non-immunes in such a community results in intense and often fatal infections amongst the newcomers.

Study of the Efficiency of the Sterilization of Dressings.

PHILLIPS *(British Medical Journal,* June 20, 1925) notes that if a package or drum of dressings is to be sterilized efficiently the steam must penetrate to the center of the package and raise it to a temperature sufficiently high to destroy any microörganisms present. In addition to the occasional use of maximum thermometers, many tests have been employed to indicate the temperature in the center of the dressings. Usually they depend on the fusion or rapid color change of an organic compound, or, more recently, on the fusion of small pieces of standard alloys.

If complete security is to be attained, the materials to be sterilized must not only be raised to a sufficiently high temperature, but must be kept at that temperature for a certain length of time. All the tests previously employed suffer from the common disadvantage of recording only the maximum temperature in the dressings without giving any indication of how long it has been maintained. A simple type of indicator has been devised, the

reading of which depends both on temperature and time, and hence gives a more trustworthy index of the efficiency of sterilization than one recording temperature alone.

The indicator consists of a small, stout, sealed glass tube containing a few drops of a standard solution of glucose and sulphuric acid. When heated to a sufficiently high temperature the solution slowly darkens in color and finally chars. The concentrations of acid and glucose are so adjusted that at 212° F. the change in color is very slow, whilst at 239° F. the solution becomes straw-colored after five minutes, bright yellow after ten minutes, deep brown after twenty minutes, and nearly black after thirty minutes.

A series of experiments was carried out to determine whether the color developed in the test solution was a satisfactory index of sterility under the ordinary condition employed for dressings. A number of sterilizing drums were packed with gamgee tissue and towels, some tightly, others loosely, and among the contents of each drum one or more of the control tubes were enclosed. Beside each control tube was placed a small glass tube containing a sporing broth culture of Bacillus subtilis. The drums were treated at various pressures for different times in a pressure steam sterilizer, and then opened. The control tubes were matched against a color scale prepared from tubes heated at 239° F. for known times, and the culture tubes were opened under aseptic conditions and subcultured to test for sterility.

It was concluded that when the color of a control tube enclosed in a package of dressings corresponded with exposure to 239° F. for not less than twenty minutes, the material had been efficiently sterilized, whilst a lighter color indicated at best doubtful efficiency.

A few preliminary tests showed that under ordinary conditions steam frequently fails to penetrate to the center of a drum of dressings even when these are not very tightly packed. This observation has recently been confirmed by Black.

Experiments were accordingly carried out to determine the factors influencing the penetration of the steam through the dressings. It was found that the tightness of packing was one of the most important.

Tumors of the Spinal Cord.

Adson *(Northwest Medicine,* July, 1925), reporting on this subject, notes that two hundred laminectomies on 189 patients were performed at the Mayo Clinic from 1910 to September 1, 1924. In this series of cases a positive or a tentative diagnosis of spinal tumor had been made. One hundred and seven of the patients were males, eighty-two were females. The average age was thirty-three years, the oldest patient in the series being sixty-five, the youngest twelve. A two-stage operation was performed on nine patients, and a three-stage operation on one, on account of the extensiveness of the lesion. The average duration of symptoms prior to examination, in patients with extradural tumors, was thirteen and three-tenths months; in those with intradural but extramedullary tumors, twenty-five and one-half months; and in those with intramedullary, more than forty-five months. The shortest history was of one month, and the longest of nineteen years.

In the thirty-five patients without tumors, but in whom lesions proved to be chronic meningomyelitis, or an unlocalized or unrecognized tumor, only one was free from motor symptoms; twenty-seven had partial motor involvement, and eleven had complete involvement. One patient was free from sensory disturbance, twenty-three had partial, and eleven complete sensory paralysis below the level involved; seven were free from bladder involvement; twenty-four had partial disturbance, and four had complete loss of function; seven were free from rectal disturbance; twenty-two had partial and six complete loss of control. As a rule, the reflexes were increased below the level of the lesion,

Besides the 154 patients in whom a tumor was found at the time of operation, four were subsequently found to have tumors; thus, lesions were verified in 158 cases.

Thirty-eight tumors were located in the cervical region, or in the cervicodorsal or cervico-occipital, the chief portion of the tumor being in the cervical region; ninety-three were situated in the dorsal area, twenty-one in the lumbar, and six in the sacral.

A review of these cases demonstrates that root pain is an early and important symptom, but that it is not always present. It is further evident that complete paralysis of motor and sensory function is not necessary to make a diagnosis, but there is no single laboratory method on which a diagnosis can be made. The presence of xanthochromia, with a suggestive history, is a diagnostic aid. The history is perhaps the most valuable factor in examination. It presents, in chronological order, first, the symptoms of irritation, then of slight pressure, and then of complete paralysis. These symptoms are characteristic of other than neoplastic lesions.

The most serious complication, in cases of tumor of the spinal cord with paralysis, is the loss of urinary control with retained urine, cystitis, pyelitis, and pyelonephritis. If the bladder is not catheterized, and is permitted to overflow, automatic control will be established, so that the bladder will empty once every two or three hours, and insure fair comfort. The patient will learn that by massaging the abdominal wall over the bladder, reflex action can be produced which will cause the bladder to empty, thus avoiding dribbling and a constant overflow. When once the bladder has been catheterized, cystitis usually develops, and it is much better to insert a retention catheter, which permits constant drainage until function returns, rather than to institute daily catheterizations. The catheter should be changed every five or seven days, and acid sodium phosphate and urotropin in equal doses of from 5 to 10 grs. should be administered three times a day for periods of ten days. In the presence of cystitis, daily irrigation with 2-per-cent boric acid solution, followed by injection of 10 cc of 20-per-cent argyrol, 10-per-cent protargol, or 1-per-cent silver nitrate, is of additional antiseptic value. Should pyelitis or pyelonephritis develop, the administration of mercurochrome intravenously has proved of value. The solution should be allowed to stand two hours before using.

With incontinence of the bladder there is likely to be paresis of the lower colon and of the sigmoid, and special precautions must be taken to prevent fecal impactions. Mineral oil in half-ounce doses from one to three times a day, with daily enemas, has been used routinely; occasionally other purgatives and laxatives are necessary.

Sexual weaknesses and impotence are also associated with disturbances of the bladder and rectum, and there will be no improvement until the neoplasm has been removed.

Decubitus ulcers are rare, except when the lesion becomes extensive and produces complete paralysis below the segment involved; pressure over the decubitus ulcer should then be avoided, and a mild antiseptic applied, besides dry heat for periods of from thirty minutes to three hours a day.

Laboratory studies are of value, and a comprehensive examination of the spinal fluid should be made. The Froin syndrome, or the presence of xanthochromia in the spinal fluid, which gives it a yellow color, is of significance, since it is frequently found below the tumor, especially if the arachnoid canal is entirely blocked. However, xanthochromia may be present also in certain inflammatory lesions of the cord, and it has been reported by Cushing and Ayer to have been present above the tumor in the cerebrospinal fluid. The Nonne test of the increased globulin is usually positive in the presence of tumor of the spinal cord, especially if the arachnoid canal is blocked. Occasionally the cell count is increased, but as a rule it is not.

The most important clinical test is the Queckenstedt, which indicates a block in the spinal fluid within the arachnoid canal. This test is made by inserting a spinal puncture needle into the spinal canal through the fourth lumbar space and connecting it with a graduated cylinder which permits the cerebrospinal fluid to seek its normal pressure

level, which is approximately 12 cm. Both jugulars are then compressed, and if there is no block within the spinal cord, the cerebrospinal fluid will rise quickly to a level of 15 or 18 cm., dropping suddenly when the pressure on the internal jugulars is released. If there is a block in the spinal canal, there will be no rise on compression of the jugulars, and no drop when the pressure is released. If there is a partial block, the rise in the manometer will be slow, and not so high as when there is no block, and the drop will in turn be gradual. The only problem confronting the operator is the determination of the probable cause of the block, since adhesions from meningitis may produce block or partial block similar to that of the tumor.

The New Surgery.

Under this title KELLY *(Medical Journal and Record,* July 1, 1925) summarizes the advantages of bipolar electrocoagulation, monopolar desiccation and electric molecular disintegration by the cutting needle. Clark calls the electric principles involved in his procedure by the established name, diathermy, while Wyeth seeks to emphasize the difference between these currents in their already well-known medical and their more recent surgical uses by the term endothermy.

The needle, functioning as a knife, actually separates tissues as neatly and as readily as a scalpel. It has a light sterilizable fiber handle, and is of such length or curvature as best adapts it to the work to be done. This new-fashioned scalpel is held delicately poised in the fingers like a pen and used as a sort of wand to divide the tissues, which actually part before they are touched.

There must be no pressure whatever and no delay at any point as the tissues yield, a circumstance which at first presents a slight difficulty to one only accustomed to manipulating a scalpel. By slight regulations of the current, the operation proceeds more or less rapidly. For delicate dissections of nerves and vessels, as for example in high breast axillary work, the current is cut down to a minute gentle stream. In mass dissection, as in cutting through pedicles or removing larger amounts of disease, a heavier current is registered. In dividing the skin, it is desirable to use a current strength between the two to secure efficiency and yet not to penetrate more than a tenth of a millimeter laterally. Divided lymphatics are thus sealed and there is a notable diminution in capillary oozing. The dissection is far more beautiful and cleaner, more rapid and more satisfactory than any knife work, especially in separating intra-abdominal adhesions. There is much less mopping and delay over capillary oozing, while larger vessels are often seen and clamped before they are divided, and later coagulated and dropped or ligated. There is throughout less handling of the wound in this forceps and needle procedure. It remains to be seen in the division of the skin whether the advantage lies with a skilful use of the sector or with the scalpel in the matter of subsequent primary union.

Twitching of any of the larger muscles touched can be lessened by cutting down the current or by grasping the muscle firmly with forceps before dividing. There is one real danger due to the fact that the division of the tissues ahead of the needle point proceeds in a manner so remarkable and so unexpected that one might easily sever peritoneum and contiguous bowel with one slight stroke. The dissection does not, therefore, proceed as we are accustomed to to see it by easy stages and layer by layer, but simply dead ahead through every contiguous structure. It is most important also to remember the danger of any contact whatever while dissecting near large vessels such as the axillary, especially when the pectoralis is jerking. The interposition of a wooden spatula here will obviate trouble.

Probably the last thing anticipated by any surgeon was that the time-honored scalpel would find a successful rival.

Desiccation is a process of Clark's by which the high tension of a monopolar spark played at the end of a needle into the more or less superficial tissues dehydrates and reduces them to a dry, even powdery, condition, in which they can be wiped or gen-

tly scraped away. The underlying area is sterilized by this procedure and can be kept so by suitable dressings until a rapid, almost scarless, healing has taken place. Pain from the use of the current is obviated by local injections of a weak solution of novocaine. There is a large field for desiccation in the removal of moles, fibrous growths, other skin blemishes, and superficial epitheliomata, as well as in hemorrhoids. Desiccation is also invaluable in rapidly wiping out flat or slightly elevated papillary growths disseminated over the peritoneum. An important use is over the base of an area which has been bared by the sector, to stop hemorrhage and seal lymphatics.

Coagulation calls for the bipolar current also delivered at a needle point, and breaks down the cellular structure of the tissues and condenses them into a necrotic mass. An average action extends readily 0.5 cm. out into the tissues in all directions. The impression as the needle is inserted and the current turned on by one who uses it for the first time is that of a minute or a heavy explosion of lightning within the tissues.

In the old-fashioned bloody surgical operations commonly in vogue, Kelly recalls with some repulsion the messiness of the procedure, the sponging, the tying, the needling, and the general manipulations of the wound which must contribute to many bad results.

He therefore welcomes this new method of coagulation as a great addendum to our technique, not only enabling us to do some things better, but greatly enlarging our field of beneficent activity.

These new principles are destined to command an extensive readjustment of the surgical field, adding enormously to the satisfaction of the operator and the comfort of the patient; in a large percentage of our cases scalpel and ligature surgery, the old method, is destined to seem obsolete and crude when compared with the new, which is neater, cleaner, and more effective.

The new electric methods are not simple substitutes or alternative methods of doing what we have done equally well by other procedures.

These methods are not to be learned completely in a week or a year. They call for careful attention to a new technique, for discriminating judgment in their application, and for increasing boldness with a growing experience.

Venoclysis.

Under this title HENDON (*American Journal of Surgery*, Vol. XXXIX, No. 4, 1925) describes his method of administering liquids and glucose solutions continuously through the vein. His apparatus consists of a thermos bottle, a curved trocar and a cannula. His cannula has openings in its side and a shoulder that enables it to be so tied into a vein that it will not slip out. In one reported case 5-per-cent glucose solution was delivered, at the rate of forty drops per minute for forty-eight hours. In another case the drip was continued without interruption for eight days and nights, during which time twelve quarts of 5-per-cent glucose solution were given.

According to Unger and Heuss continuous intravenous infusion, as recommended by Friedmann and Leowen, was tried as a last resort in eighty-two cases, those of children and adults. Eighteen of the patients lived. The quantity of liquid given in twenty-four hours varied from three to eleven liters. The infusion was usually continued for two or three days, but in especially grave cases was given for four or five days. The technique was the ordinary one. After venesection a blunt cannula was tied into the ulnar vein and the arm placed on a straight splint. The fluid was given at the rate of from sixty to one hundred drops a minute. Special warming apparatus was dispensed with since it could be safely left to the body to raise these few drops a minute to body temperature. The main indications, according to these authors, are grave collapse, extensive burns, and marked dehydration (typhoid, dysentery, cholera). When the hemoglobin is low, and in cases of arteriosclerosis, care is necessary with regard to the quantity given. Undesired sequelæ were edema, hypostatic pneumonia,

and thrombosis of the arm vein. The last-mentioned never caused any further complication.

A man weighing 70 kg., when resting quietly in bed, may receive and utilize 63 gm. of glucose by vein per hour without glycosuria. He then receives four times 63, or 252 calories per hour, a rate corresponding to 6048 calories per day. If his resting requirement is 3000 calories per day, he could thus receive double what he needed, or enough to cover the caloric expenditure of the same man during heavy physical exertion. Intravenous nutrition with glucose is thus proved to be a feasible clinical proposition.

As one gramme of glucose yields 3¾ calories, 800 grammes of glucose per day would meet resting requirements, or not less than a liter and a half or more than two liters of a 5-per-cent solution of glucose intravenously. Sixty drops of the solution per minute would aggregate 3½ pints in twenty-four hours, which constitutes the amount required.

The intravenous method of introducing fluids and nutriment during the period of grave physical crisis, when the powers of absorption and assimilation are practically abolished or suspended, is practical. The procedure is safe, simple, accurate, and prompt in its effects. Up to the present no untoward accidents have been reported in connection with its use. The physiological indications for its employment are numerous and quite obvious, and there is ample ground to expect its wide application.

Forcing Fluids for Infections of the Urinary Tract.

HAINES *(Medical Journal and Record,* July, 1925) states that there are a number of pathological conditions wherein it seems imperative to force fluids in quantities out of all proportion to the patient's willingness, and, in many cases, ability, to imbibe them.

There are several methods of forcing fluids other than directly by mouth. There is the Murphy drip method, but this often fails because the fluid is partially expelled before it can be absorbed. There is hypodermoclysis, which is a rather cruel treatment and soon reaches its limits. There is the method of infusion, which is not satisfactory because of the risk of injecting bacteria or air emboli into the blood stream. And there is the method of directly flushing the lower urinary tract, including the pelvis of the kidney, through catheterization, but it is always resorted to with great hesitation for fear of traumatizing the mucous membrane; besides, considering the risk and the amount of work involved, rarely does enough water reach the urinary tract to make this method of treatment seem worth while.

Ever since 1908, when Einhorn first employed the duodenal tube for alimentation in the treatment of gastric ulcerations, its use has gradually been extended to many other pathological conditions, both surgical and medical, including the forcing of fluids in cases of thromboangitis obliterans.

The duodenal tube is an adjunct, in any therapeutics requiring large quantities of fluid, the value of which cannot be overestimated.

The tube is best given by the Lyons method, which is comparatively easy and quick. Lyons gives the tube in the morning on a fasting stomach. It is swallowed to the 55 cm. mark, thus getting the bucket into the stomach. A small glass of water is then given, the patient is placed on the right side, the head lowered, and the hips raised on pillows. The patient is now encouraged to make slow swallowing movements until the 75 cm. mark has been reached. It will usually be found that the tube is in place in the duodenum in from twenty to forty minutes. In order to find out whether this is so a small amount of fluid should be aspirated through the tube and tested with litmus paper. If the reaction is alkaline it is usually a sign that the bucket is in the duodenum, but an acid reaction usually signifies that the bucket has not yet passed the pylorus. If the bucket is not in the duodenum the patient should be kept on the right side until it is.

In all cases the amount of the fluid given

each day and the length of the treatment should be regulated according to clinical symptoms.

While treatment by means of the duodenal tube may at first seem somewhat heroic, it should be remembered, in the first place, that this appears the only satisfactory method for the administration of fluids in large quantities. Besides, once the tube is *in situ*, it can be allowed to remain thus for days, or if it is removed there is rarely any difficulty in the taking or giving it again.

Treatment of Toxemia Associated with Gastric Stasis.

McVicar *(Minnesota Medicine,* July, 1925) calls attention to that form of functional or non-obstructive ileus which occurs after operation, and is clinically indistinguishable from that caused by actual organic obstruction. This results in a toxemia characterized by vomiting, dehydration, neuromuscular irritability, prostration, low-blood-pressure, oliguria, or anuria, while fulminant cases sink into what may be termed a typhoid state. Vomiting is seldom forcible but is rather a "slopping over" of accumulated secretion. If vomiting does not occur, large amounts of secretion may be recovered by the stomach tube. Dehydration is usually extreme and the hemoglobin reading may be high, due to concentration of the blood. Neuromuscular irritablity shows itself in twitchings of superficial muscles, and occasionally in tetany.

Prostration may be extreme, with low blood-pressure and the thready pulse of shock. The patients become drowsy, semicomatose, and may have a semicadaverous appearance which is sometimes relieved by a malar flush due probably to the high percentage of hemoglobin in the blood and the decreased vasomotor tone of the blood-vessels. The physical signs of obstruction are often absent; the abdomen is not distended or tense, peristalsis disappears, and there is no complaint of severe abdominal pain. This is a clinical picture of approaching dissolution, and although patients with these symptoms may be resuscitated in a dramatic fashion by appropriate treatment, it is desirable that the toxemia should be recognized earlier so that treatment may be instituted promptly.

The most significant diagnostic criteria are obtained by studies of the blood chemistry, which, if toxemia exists, will reveal an increase in the blood urea or other non-protein fractions, a decrease in the plasma chlorides, and a tendency toward an increase in the alkali reserve of the blood, as shown by an increased ability of the plasma to combine with carbon dioxide. The rise in blood urea is probably due chiefly to increased tissue catabolism, since the nitrogen excreted in the urine is greatly in excess of what would be expected from the low intake of proteins in the food.

It has been demonstrated that tetany occurs only in cases in which there is a high alkali reserve, and that tetany should be anticipated when the carbon dioxide combining power of the plasma rises above 100 volumes per cent, although much higher values may be attained without spontaneous carpopedal spasm.

In the treatment of toxemia with gastric stasis McVicar has used intravenous injections of 10 gm. (1 per cent) of sodium chloride and 100 gm. of glucose (10 per cent) in 1000 cc of freshly distilled sterile water. At least twenty minutes are allowed for each injection; 1, 2, or 3 liters of the solution are injected daily, the intravenous injections being supplemented by hypodermoclysis and proctoclysis. Water and hypertonic solutions of sodium chloride and glucose are all diuretics of the first order. Hypertonic solutions of sodium chloride and glucose also stimulate peristalsis, as has been shown experimentally. Physiologic sodium chloride solution has proved efficient in restoring depleted chlorides and in reducing the carbon dioxide combining power of the blood. Clinical improvement is heralded by free diuresis and the restoration of peristalsis. This improvement may be measured by the daily studies of the blood chemistry.

The stomach is lavaged only to secure diagnostic data in the early stages and to

remove excessive accumulations of secreted materials which by their gross weight may embarrass the gastric motor function. The hypothesis that this secretion is toxic and that its removal eliminates one cause of the toxemia is not supported by clinical experience. If it can be made to move onward the fluid and the hydrochloric acid which it contains are undoubtedly useful adjuncts in treatment. Alkalies, for example bicarbonate of soda, are contraindicated because they may increase the alkalosis and thereby predispose to tetany. This point deserves special emphasis since bicarbonate of soda has been widely recommended in text-books and by surgeons as a constituent of solutions to be used postoperatively for lavage and for proctoclysis. The use of alkalies should be restricted to cases in which acidosis is suspected clinically and the suspicion is supported by adequate laboratory proof.

The toxemia may be controlled in the presence of actual organic obstruction, thereby reducing the risk of the operation indicated to relieve the obstruction. In postoperative stasis simulating organic obstruction, relief from the toxemia by appropriate treatment frequently clears up all suspicion of organic obstruction. Early recognition of this toxemia depends on a wide threshold of suspicion, early studies of the chemistry of the blood, and an accurate daily summary of gastric retention, urinary output, fluid balance, and blood-pressure.

Balfour, commenting on this paper, notes that in the preoperative management of cases with marked obstruction at the pylorus, whether from a benign or a malignant lesion, the surgeon has learned that operation can be carried out with much greater safety if preparation of the type just outlined has been made. Another advantage of the preoperative neutralization of toxemia is that the patient has become accustomed to the use of the stomach tube, so that its postoperative use, whenever necessary, is not quite so discomforting as it would have been had the stomach not already been systematically lavaged. The advantage in the treatment of carcinoma with obstruction is even greater; for not only is the toxemia controlled, but in many cases it becomes possible to do a resection of the stomach in one stage in cases in which the risk of a one-stage operation was formerly found to be so high that it was necessary to relieve the obstruction first, and then remove the growth at a secondary operation.

The Diagnosis of Aural Syphilis.

PACKARD (*Atlantic Medical Journal*, July, 1925) observes that the most frequent and most serious manifestations of syphilis in the ear are those which involve the internal portion of this organ.

Syphilis of the inner ear is generally characterized by certain peculiarities in its onset and progress. In the great majority of cases there is a history of sudden onset of deafness, with intense tinnitus and vertigo. The deafness is generally bilateral and the labyrinthine tests show that both labyrinths are involved, though frequently one more than the other. Perception of sound through the cranial bones is greatly diminished or lost in the affected ear, or if the condition is bilateral, in both ears. The sudden onset is followed usually by a rapidly progressive increase in the deafness, the patient frequently becoming totally deaf in a few days. No objective symptoms are presented on examination of the ears, except the functional disturbances above mentioned.

Thus, when a patient presents himself with a history of deafness of sudden onset, in one or both ears, accompanied by intense tinnitus and with no definite symptoms present on ocular examination of the ear, our suspicions of a syphilitic origin should be aroused. Occurring as a tertiary lesion, the patient will, in all probability, have or have had some positive manifestations of the disease to confirm the diagnosis, but, just as in all suspicious cases, the Wassermann test is our great standby.

It should be borne in mind that syphilis of the internal ear progresses with terrific rapidity to complete loss of function, and

therefore early diagnosis and institution of proper treatment are of the utmost importance. It consequently behooves us to use every means in our power to clear up the diagnosis at once. In the old days this was often a matter of great difficulty, as we had to rely on the therapeutic test, and by the time we had our suspicions confirmed, irreparable damage had been done.

Although there was at one time a tendency to think that the administration of salvarsan in syphilis of the internal ear was dangerous, with the recent improvements in technique all such danger has disappeared and we can safely use the only therapeutic agent of any real value.

The Significance and Prevention of Blindness Due to Intranasal Disease.

GOTTLIEB *(American Journal of Surgery,* July, 1925) finds that the ophthalmologist who examines the visual fields for form and color perception on every patient will attest that it is surprising to note the number of people with concentric contraction of their vision. Many of them are unaware of their condition.

Retrobulbar optic neuritis is an interstitial inflammation affecting usually the axial bundle of the orbital portion of the optic nerve. It is due to pressure or inflammation in the optic canal or at the chiasm. The most common cause is disease in the nasal accessory sinuses, particularly the posterior ethmoid and sphenoid. The nerve may become affected by direct extension, by collateral edema, or by transmitted pressure, especially if the bony optic canal is incomplete.

The acute form begins with headache, and pain and tenderness in the affected eye. The patient complains of a blurring of the vision of this side which rapidly becomes worse, so much so that the vision may become obliterated in the course of a day or two. No apparent change can be noted in the optic fundus at first. After the condition has progressed considerably a blurring and congestion of the nerve head appears.

The chronic form comes on slowly. There may be only a contraction of the visual fields for form and color without the central blurring. Recovery from both the acute and chronic forms depends upon the rapidity with which the cause is found and eliminated. Recovery from the chronic type is slower and less certain than from the acute.

The appearance of the mucous membrane over the middle turbinate bones and adjacent tissues gives no indication, as a rule, of the condition of the sinuses.

In cases of threatened blindness from nasal accessory sinus disease of the non-purulent character, the outlook for recovery is exceptionally bright.

If time permits all other causes should be excluded before operating. If time is precious one is justified in opening up the sinuses without further investigation. The element of haste is so important that it cannot be overemphasized. The middle turbinates should not be spared in any instance.

Correspondence

Neurosyphilis and Malaria.

To the Editors of the THERAPEUTIC GAZETTE.

SIRS: In your issue of May 15, 1925, you mention the treatment at St. Elizabeth's Hospital of neurosyphilis by inoculation with malaria. This I regard as a vital error, as in my opinion the benefit which follows is in no way due to the malarial disease, but to its treatment by quinine.

Quinine is an ancient remedy for syphilis, for I remember in my undergraduate days one of my teachers impressing on my mind that when mercury and iodine fail, to give a course of quinine, 10 grains three times a day. For thirty years I have used quinine, where other antisyphilitic remedies failed, often with pronounced benefit.

Yours, etc.,

C. JOYCE, M.D.

KELMSCOTT, W. AUSTRALIA.